

SEQUENCE LISTING

<110> SYKES, KATHRYN F.
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<120> METHODS AND COMPOSITIONS FOR VACCINATION COMPRISING
NUCLEIC ACID AND/OR POLYPEPTIDE SEQUENCES OF THE GENUS
BORRELIA

<130> MCRO:003US

<140> UNKNOWN

<141> 2003-10-17

<150> 60/419,401

<151> 2002-10-18

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<170> PatentIn Ver. 2.1

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<213> *Borrelia burgdorferi*

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His Ser Lys Asp Ile Ser Asn Leu Arg Thr Leu Asn Asp Ser Leu Ser
 65 70 75 80

Gln Glu Leu Ala Arg Leu Lys Ser Asn Leu Asn Asn Glu Gly Met Phe
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 35 40 45
 Tyr Gly Leu Ser Lys Glu Tyr Glu Leu Val Pro Ser Ser Glu Ser Val
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 65 70 75 80
 Ser Trp Val Pro Thr Ala Asp Lys Phe Tyr Tyr Glu Lys Leu Lys Thr
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 Lys Phe Val Asp Leu Gly Ala Asn Tyr Glu Gly Thr Ile Gln Gly Phe
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 35 40 45
 Gly Phe Val Leu Arg Asp Phe Asp Asn Ser Ile Asp Ser Glu Lys Leu
 50 55 60
 Trp Phe Cys Ala Leu Glu Cys Leu Glu Ser Asn Gly Tyr Ile Asn Tyr
 65 70 75 80
 Glu Ile Thr Asn Phe Ala Leu Lys Gly His Glu Ser Arg His Asn Lys
 85 90 95
 Leu Asn Trp Glu Leu Lys Pro His Leu Gly Leu Gly Leu Tyr Ala Val
 100 105 110
 Ser Leu Leu Phe Cys Asn Asp Lys Asn Asn Asn Val Arg Ala Leu Ile
 115 120 125
 Arg Lys Thr Gly Ser Phe Val Lys Ala Asn Asn His Leu Val Thr Phe
 130 135 140
 Glu Leu Leu Glu Asp Leu Glu Phe Phe Val Tyr His Phe Ile Gln Gly
 145 150 155 160
 Leu Gly Thr Ile Gln Gly Val Ser Leu Arg Ala Leu Arg Leu Arg Phe
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 Leu Ser Lys Lys Phe Val Phe Asp Asp Asn Ile Met
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Glu Leu Lys Cys His Leu Ile Leu Leu Gly His Pro Ile Ile Lys Thr
35 40 45

Leu Tyr Ile Lys His Val Asp Phe Cys Leu Ser Arg Gln Asp Asn Leu
50 55 60

Lys Phe Ile Phe Thr Ser Leu Ser Lys Tyr Ile Asn Leu Glu Leu Leu
65 70 75 80

Glu Glu Phe Thr Leu Glu Ile Ile Pro Gly Tyr Val Asp Phe Glu Lys
85 90 95

Phe Lys Leu Leu Asp Glu Phe Cys Ile Thr Arg Ile Asn Leu Asn Val
100 105 110

Gln Ser Phe Ser Leu Glu Phe Arg Lys Ile Val Gly Ile Pro Glu Ile
115 120 125

Ser Tyr Lys Lys Leu Asn Ile Leu Ile Asn Asn Ile Arg Lys Phe Pro
130 135 140

Phe Asp Leu Asn Ile Asp Met Thr Val Asn Met Pro Leu Gln Lys Lys
145 150 155 160

Ser His Leu Lys Arg Asp Leu Lys Glu Leu Leu Ser Tyr Met Pro Glu
165 170 175

His Ile Cys Phe Ser Asp Phe Ile Cys Glu Glu Glu Gly Phe Val Leu
180 185 190

Arg Asp Phe Asp Asn Ser Ile Asp Ser Glu Lys Leu Trp Phe Cys Ala
195 200 205

Leu Glu Cys Leu Glu Ser Asn Gly Tyr Ile Asn Tyr Glu Ile Thr Asn
210 215 220

Phe Ala Leu Lys Gly His Glu Ser Arg His Asn Lys Leu Asn Trp Glu

25348199.1

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Ser Phe Val Lys Ala Asn Asn His Leu Val Thr Phe Glu Leu Leu Glu						
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Asp Leu Glu Phe Phe Val Tyr His Phe Ile Gln Gly Leu Gly Thr Ile						
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Gln Gly Val Ser Leu Arg Ala Leu Arg Leu Arg Phe Glu Tyr Asn Glu						
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Lys Gln Phe Phe Gln Phe Ile Asn Tyr Cys Ser Thr Leu Ser Lys Lys						
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Phe Val Phe Asp Asp Asn Ile Met Leu Leu Lys Gly Arg Glu Arg Phe						
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Lys Leu Asn Phe Tyr Leu Val Lys Ile Ile Asn His Phe Asn Asp Asn						
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 Lys Tyr Leu Asn Asn Glu Gly Leu Leu Ser Ile Ser Glu Ile Glu Glu
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<210> 16
<211> 1277
<212> PRT
<213> Borrelia burgdorferi

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<222> (186)
<223> Xaa = anything

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<220>
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<222> (573)

<223> Xaa = anything

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			20					25					30		
Leu	Lys	Asp	Phe	Phe	Ile	Leu	Ile	Lys	Asn	Lys	Leu	Phe	Ser	Ile	Asp
		35					40					45			
Asp	Asn	Ser	Thr	Glu	Ala	Asn	Ile	Glu	Ser	Leu	Leu	Lys	Tyr	Ile	Phe
	50					55					60				
Glu	Glu	Leu	Asn	Tyr	Ser	Val	Glu	Gln	Gln	Lys	Ala	Gly	Gln	Ile	Glu
65					70					75					80
Gly	Val	Glu	Ser	Arg	Val	Asp	Ile	Leu	Leu	Phe	Glu	Asn	Asp	Lys	Asp
				85					90					95	
Lys	Ala	Ser	Phe	Asn	Asn	Lys	Leu	Lys	Glu	Ala	Lys	Lys	Asn	Asn	Glu
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Pro	Ile	Pro	Ile	Glu	Asp	Ile	Leu	Ile	Ile	Ala	Glu	Val	Lys	Arg	Pro
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Thr	Phe	Ser	Phe	Asp	Ala	Lys	Asp	Lys	Leu	Lys	Glu	Ser	Glu	Asp	Gln
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Asn	Gly	Lys	Val	Trp	Arg	Leu	Tyr	Asp	Lys	Ser	Lys	Val	Leu	Tyr	Gly
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Glu	Lys	Arg	Tyr	Ile	Glu	Phe	Asn	Phe	Xaa	Lys	Ile	Glu	Glu	Lys	Glu
			180					185					190		
Glu	Tyr	Lys	Glu	Gln	Glu	Trp	Phe	Val	Leu	Phe	Ile	Tyr	Leu	Ile	Arg
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Gln	Ile	Ala	Lys	Glu	Lys	Glu	Ile	Ile	Gln	Lys	Thr	Leu	Lys	Glu	Ile
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Leu	Tyr	Glu	Arg	Pro	Asp	Asp	Ser	Ile	Val	Phe	Lys	Ile	Ala	Lys	Asn
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			260					265					270		
Ile	Leu	Ala	Ser	Ile	Leu	Glu	Glu	Ser	Ile	Ile	Phe	Ile	Leu	Arg	Ile
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Phe Phe Ile Ala Tyr Ile Glu Asp Asn Asp Ile Phe Lys Lys Ile Leu
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Gln Glu Asn Lys Leu Tyr Arg Ser Ser Ile Ser Phe Arg Tyr Phe Phe
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Tyr Asp Glu Asn Thr Lys Lys Lys Leu Glu Tyr Lys Lys Ile Ile Thr
325 330 335
Ile Phe Asn Leu Leu Asp Lys Gly Ser Asp Ala Ile Lys Phe Pro Val
340 345 350
Phe Asn Gly Gly Leu Phe Ser Glu Asp Lys Val Lys Tyr Leu Asn Asn
355 360 365
Glu Gly Leu Leu Ser Ile Ser Glu Ile Glu Glu Ile Leu Val Lys Met
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Leu Phe Phe Glu Glu Lys Asn Ile Lys Asp Glu Lys Phe Val Lys Tyr
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Ser Arg Leu Asp Pro Lys Ser Phe Gly Glu Leu Tyr Glu Thr Leu Leu
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Glu Tyr Asp Leu Arg Ile Ala Asp Thr Thr Val His Arg Ile Ile Glu
420 425 430
Asp Gly Val Tyr Leu Ile Arg Thr Glu Glu Glu Leu Glu Asn Lys Lys
435 440 445
Val Asn Lys Ile Ala Thr Tyr Leu Lys Gly Asn Ile Tyr Leu Thr Ser
450 455 460
Arg Ser Leu Asp Arg Lys Lys Ser Gly Ala Tyr Tyr Thr Pro Asp Asp
465 470 475 480
Leu Thr Asp Phe Met Val Ile Ser Ser Ile Glu Glu Gln Leu Lys Thr
485 490 495
Lys Ser Pro Leu Asp Ile Lys Ile Ile Asp Asn Ser Cys Gly Ser Gly
500 505 510
His Phe Leu Ile Ser Cys Leu Asp Tyr Leu Thr Glu Lys Val Trp Tyr
515 520 525
Glu Leu Asp Lys Phe Glu Asp Val Lys Lys Glu Leu Asp Glu Glu Tyr
530 535 540
Arg Val Ile Ile Glu Glu Ser Glu Glu Tyr Asp Val Gln Asp Ser Ile
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Ser Lys Glu Leu Val Leu Lys Arg Met Leu Leu Lys Xaa Cys Ile Tyr
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Gly Val Asp Ile Asn Pro Ile Ser Val Glu Ile Thr Met Leu Ser Leu
580 585 590

Trp Ile Asn Thr Phe Ile Phe Gly Thr Pro Leu Ser Phe Ile Glu His
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 His Ile Lys Ala Gly Asn Ala Leu Leu Gly Tyr Thr Lys Asp Glu Phe
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 Phe Asp Ile Val Lys Lys Lys Phe Glu Ser Gly Phe Ser Leu Phe Lys
 625 630 635 640
 Lys Arg Ile Lys Glu Ile Ile Thr Ile Leu Glu Asp Ile Tyr Gln Lys
 645 650 655
 Ile Lys Gly Ile Asn Asp Thr Thr Lys Glu Asp Ile Glu Lys Ser Lys
 660 665 670
 Lys Ile Tyr Lys Glu Tyr Glu Glu Ser Lys Asp Ile Asp Asn Leu Arg
 675 680 685
 Ile Ile Phe Ser Leu Ile Lys Leu Tyr Ser Leu Ser Phe Asp Lys Ser
 690 695 700
 Leu Asn Met Glu Phe Ser Asp Ile Ala Ser Val Ile Ser Leu Ile Glu
 705 710 715 720
 Asn Ile Leu Gly Asn Lys Thr Ser Ser Glu Asp Lys Glu Lys Ile Glu
 725 730 735
 Lys Ile Arg Lys Leu Ser Ser Tyr Tyr Lys Phe Phe His Tyr Gly Ile
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 Glu Phe Pro Asp Ile Gln Glu Gly Phe Asp Ile Val Ile Gly Asn Pro
 755 760 765
 Pro Trp Glu Lys Thr Lys Phe Asn Glu Thr Glu Phe Phe Ser Lys His
 770 775 780
 Ile Pro Asn Tyr Arg Lys Leu Gly Ile Lys Glu Gln Asn Ile Ile Lys
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 Gln Glu Ile Leu Ser Lys Asp Asn His Pro Leu Ser Ile Glu Tyr Asn
 805 810 815
 Glu Glu Lys Asn Ser Ile Ile Ala Ile Asn Asn Ile Tyr Lys Phe Asp
 820 825 830
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 835 840 845
 Val Thr Phe Asn Leu Lys Leu Ile Lys Glu Lys Gly Asn Leu Thr Tyr
 850 855 860
 Leu Val Pro Ser Ala Ile Trp Asn Glu Ser Ser Ser Arg Ile Leu Arg
 865 870 875 880
 Lys His Ile Phe Ala Arg Tyr Lys Leu Asn Tyr Ile Tyr Gln Phe Glu
 885 890 895

Asn	Lys	Lys	Arg	Phe	Lys	Asp	Val	His	Ser	Ser	Phe	Lys	Phe	Ala	Ile	900	905	910
Phe	Gln	Leu	Ser	Asn	Ile	Lys	Glu	Ser	Thr	Ser	Ser	Phe	Lys	Ala	Lys	915	920	925
Phe	Met	Ile	Gln	Ser	Ser	Asp	Asn	Ile	Leu	Lys	Glu	Ile	Thr	Arg	Asp	930	935	940
Leu	Lys	Asp	Ser	Lys	Asp	Asp	Ala	Tyr	Lys	Gly	Ile	Glu	Leu	Asn	Ile	945	950	955
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Ser	Ala	Leu	Gly	Glu	Gly	Tyr	Ile	Asp	Phe	Lys	Lys	Gly	Leu	Asp	Pro	995	1000	1005
Ser	Ile	Lys	Asn	Arg	Lys	Ser	Leu	Leu	Lys	Glu	Cys	Asn	Asn	Lys	Asn	1010	1015	1020
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Thr	Glu	Arg	Val	Phe	Tyr	Arg	Ala	Ile	Ala	Ser	Asn	Thr	Asn	Glu	Arg	1075	1080	1085
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Met	Pro	Gln	Pro	Glu	Glu	Lys	Glu	Ile	Leu	Ser	Asn	Pro	Leu	Tyr	Leu	1155	1160	1165
Asn	Leu	Ala	Lys	Asn	Thr	Ser	Leu	Leu	Ile	Ala	Lys	Asn	Asp	Pro	Glu	1170	1175	1180
Asn	Phe	Lys	Tyr	Leu	Leu	Tyr	Leu	Glu	Tyr	Phe	Lys	Phe	Asp	Lys	Glu	1185	1190	1195

Lys Val Asn Lys Ile Leu Lys Leu Asp Lys Glu Asp Glu Phe Phe Lys
1205 1210 1215

Glu Lys Glu Asn Glu Asn Asn Phe Ile Ile Ala Ser Leu Tyr Ser Leu
1220 1225 1230

Ala Lys Glu Asp Phe Ile Thr Leu Leu Gly Asp Phe Lys Ala Leu Lys
1235 1240 1245

Asn Lys Lys Lys Gly Glu Asp Tyr Ile Ser Ser Leu Ile Lys Gly Tyr
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Asp Asn Tyr Leu Leu Asn Asn Lys Ile Phe Tyr His Lys
1265 1270 1275

<210> 17

<211> 197

<212> DNA

<213> *Borrelia burgdorferi*

<400> 17

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gttgacctag ctggaggtgc aatagacgaa caatttacat accactatat aaaaaatgaa 180
gcgattattg agcttat 197

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<211> 65

<212> PRT

<213> *Borrelia burgdorferi*

<400> 18

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Thr Ala Lys Ile Asn Phe Tyr Ser Leu Leu Asn Glu Thr Gly Leu Asp
20 25 30

Gly Val Pro Ala Phe Lys Glu Gly Val Asp Leu Ala Gly Gly Ala Ile
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Asp Glu Gln Phe Thr Tyr His Tyr Ile Lys Asn Glu Ala Ile Ile Glu
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Leu
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<210> 19

<211> 1113

<212> DNA

<213> *Borrelia burgdorferi*

<400> 19

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 <213> *Borrelia burgdorferi*

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  20              25              30

Lys Ile Lys Val Asn Lys Asp Ala Ala Asn Tyr Lys Ile Leu Asn Leu
  35              40              45

Thr Val Asn Asn Tyr Glu Lys Gln Ile Glu Thr Leu Glu Lys Asp Asn
  50              55              60

Gly Asn Gly Gln Asp Gln Phe Gly Lys Glu Lys Thr Leu Leu Lys Thr
  65              70              75              80

Ala Met Ser Asn Phe Phe Asn Ser Ser Glu Glu Ser Leu Lys Ser Ala
  85              90              95

Asp Leu Phe Ile Tyr Lys Asp Lys Pro Glu Glu Leu Lys Lys Tyr Leu
 100              105              110

Lys Val His Arg His Thr Phe Val Val Leu Ile Asn Thr Glu Gly Asp
 115              120              125

Asn Ser Asp Asp Gly Leu Lys Ile Tyr Lys Asp Asp Tyr Asp Lys Phe
 130              135              140

Lys Thr Pro Ser Ile Phe Phe Val Phe Ser Thr Lys Glu Gln Glu Ile
 145              150              155              160

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Lys Glu Leu Phe Lys Asp Lys Gly Asn Thr Glu Lys Glu Arg Asn Ile
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 180 185 190
 Gln Tyr Leu His Gln Ala Ser Ile Phe His Ala Val Asn Pro Tyr Gly
 195 200 205
 Met Pro Leu Ala Ala Thr Pro Leu Val Asp Asp Thr Val Ile Gly Lys
 210 215 220
 Leu Arg Thr Ala Lys Ile Asn Phe Tyr Ser Leu Leu Asn Glu Thr Gly
 225 230 235 240
 Leu Asp Gly Val Pro Ala Phe Lys Glu Gly Val Asp Leu Ala Gly Gly
 245 250 255
 Ala Ile Asp Glu Gln Phe Thr Tyr His Tyr Ile Lys Asn Glu Ala Ile
 260 265 270
 Ile Glu Leu Ile Arg Ile Trp Asn Lys Asn Asn Arg Gln Asn Ser Lys
 275 280 285
 Leu Ser Ala Leu Gln Leu Ser Gly Ala Arg Asp Asn Ala Tyr Thr Ser
 290 295 300
 Ala Ile Glu Cys Leu Leu Lys Arg Phe Val Asp Arg Gly Leu Ile Ile
 305 310 315 320
 Gln Tyr Lys Asn Leu Ser Leu Thr Leu Ser Pro Thr Pro Gln Leu Lys
 325 330 335
 Leu Glu Leu Ser Val Asn Ile Thr Tyr Asn Phe Ser Ile Asn Ala Val
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<210> 21

<211> 1088

<212> DNA

<213> *Borrelia burgdorferi*

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 aaaaccattt tctaaaaaat ggaaaaattc ttaaagaatt tttttataca gaattatattc 180
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 agtaattagt gtaagtgtac ttatccattt tagcattaat ttattcttaa cagtattatt 480

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 ctaagtcatt aagtatagta gcaaggctac ctttactatc atcattcata taaattaatg 660
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 caatagtaac gctagaaaga ttgctaccaa gatggccttt agccttacca cataaagtct 780
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 tgttgtcttc ataattttca ataccttttt caagatcttt taatttatgg gaaatgctat 1020
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<210> 22
 <211> 39
 <212> PRT
 <213> *Borrelia burgdorferi*

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 Lys Asn Ile Ile Phe Leu Leu
 35

<210> 23
 <211> 750
 <212> DNA
 <213> *Borrelia burgdorferi*

<400> 23
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 attgatttgg atccacagaa ttctttaaca tcatatttta ccaagtatat tcctgacgcc 180
 gaaacatata atgtgtatag tatgttaaaa ggagatttct attttaaaaa atacttaaat 240
 aaaattaatg attatatgta tataattcct tctcatccta tgttagaaaa atttaataca 300
 gaaaccgatc aagaaacttt cttggaatat tattttaaata gaaatataat aaattgcgat 360
 tttgattata ttttgttaga cacttctcca ggttcaaatt tgctttttaa gagtgcctta 420
 aatacttcaa attatattat aattccagtt caatcagaaa tatgggtcaat agaaagtttt 480
 aatattttga tcaatattat taatggcatt acaaaacata gagaaaaaaa atataatatt 540
 tctattgtag aaaaccaatt tataaaaaat agaaatattc ttaaagaagt agaaaatctg 600
 attcataaag aatacaaaga atatatcaag ggcaagatac atttttataa tagtataaaa 660
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 <211> 248
 <212> PRT
 <213> *Borrelia burgdorferi*

<400> 24
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Glu Leu Gly Lys Lys Ile Leu Leu Ile Asp Leu Asp Pro Gln Asn Ser	35	40	45
Leu Thr Ser Tyr Phe Thr Lys Tyr Ile Pro Asp Ala Glu Thr Tyr Asn	50	55	60
Val Tyr Ser Met Leu Lys Gly Asp Phe Tyr Phe Lys Lys Tyr Leu Asn	65	70	75
Lys Ile Asn Asp Tyr Met Tyr Ile Ile Pro Ser His Pro Met Leu Glu	85	90	95
Lys Phe Asn Thr Glu Thr Asp Gln Glu Thr Phe Leu Glu Tyr Tyr Leu	100	105	110
Asn Arg Asn Ile Ile Asn Cys Asp Phe Asp Tyr Ile Leu Leu Asp Thr	115	120	125
Ser Pro Gly Ser Asn Leu Leu Leu Lys Ser Ala Leu Asn Thr Ser Asn	130	135	140
Tyr Ile Ile Ile Pro Val Gln Ser Glu Ile Trp Ser Ile Glu Ser Phe	145	150	155
Asn Ile Leu Ile Asn Ile Ile Asn Gly Ile Thr Lys His Arg Glu Lys	165	170	175
Lys Tyr Asn Ile Ser Ile Val Glu Asn Gln Phe Ile Lys Asn Arg Asn	180	185	190
Ile Leu Lys Glu Val Glu Asn Leu Ile His Lys Glu Tyr Lys Glu Tyr	195	200	205
Ile Lys Gly Lys Ile His Phe Tyr Asn Ser Ile Lys Val Leu Ile Thr	210	215	220
Lys Arg Leu Glu Pro Ser Ser Arg Glu Ile Tyr Tyr Gln Glu Ile Lys	225	230	235
Glu Thr Leu Lys Asn Ile Phe Ser	245		

<210> 25

<211> 509

<212> DNA

<213> *Borrelia burgdorferi*

<400> 25

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ttagtaaata atttgcgtaa aattggatat aaaaatatc caatttttagt agaattaaag 180

gaaaaaataa gagatttaaa gtgagatata tttttttatt cttaatatatt aagagtctaa 240
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 attgttacat tgaagtttca agtgaaattt cttctgagta tgtttattat tcttttttta 420
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<210> 26

<211> 67

<212> PRT

<213> *Borrelia burgdorferi*

<400> 26

His Tyr His Leu Asn Ile Ser His Lys Ile Lys Tyr Ile Thr Gln Val
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Ser Thr Asn Pro Val Lys Phe Ile Leu Phe Ala Asn Lys Ile Lys Asn
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Phe Pro Asn Ser Tyr Tyr Asn Tyr Leu Val Asn Asn Leu Arg Lys Ile
 35 40 45

Gly Tyr Lys Asn Ile Pro Ile Leu Val Glu Leu Lys Glu Lys Ile Arg
 50 55 60

Asp Leu Lys
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<210> 27

<211> 1302

<212> DNA

<213> *Borrelia burgdorferi*

<400> 27

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1302

<210> 28

<211> 433

<212> PRT

<213> Borrelia burgdorferi

<400> 28

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Lys Ser Ala Leu Phe Asn Arg Ile Leu Asp Thr Lys Arg Ser Ile Thr
20 25 30

Glu Ser Thr Tyr Gly Val Thr Arg Asp Leu Val Glu Glu Val Cys Lys
35 40 45

Val Asp Ser Phe Lys Phe Lys Leu Ile Asp Thr Gly Gly Phe Thr Ile
50 55 60

Leu Lys Asp Glu Ile Ser Lys Ile Val Val Gln Lys Val Leu Ser Ser
65 70 75 80

Leu Glu Lys Val Asp Leu Ile Leu Leu Val Leu Asp Ile Asn Glu Ile
85 90 95

Leu Leu Glu Asp Tyr Gln Ile Ile Glu Arg Leu Arg Lys Tyr Ser Ser
100 105 110

Lys Val Val Leu Val Leu Asn Lys Val Asp Thr Lys Asp Lys Glu Cys
115 120 125

Leu Ala His Glu Phe His Asn Leu Gly Phe Lys Arg Tyr Phe Leu Val
130 135 140

Ser Ala Ala His Cys Arg Gly Ile Thr Lys Leu Arg Asp Phe Leu Lys
145 150 155 160

Val Glu Val Gly Glu Val Gly Ile Glu Ser Gly Ala Asp Ile Lys Val
165 170 175

Gly Ile Ile Gly Lys Pro Asn Ser Gly Lys Ser Thr Leu Ile Asn Tyr
180 185 190

Leu Ser Gly Asn Glu Ile Ala Ile Val Ser Asp Gln Pro Gly Thr Thr
195 200 205

Arg Asp Phe Ile Lys Thr Lys Phe Thr Arg Asn Gly Lys Val Phe Glu
210 215 220

Val Val Asp Thr Ala Gly Ile Arg Arg Arg Ala Arg Val Asn Glu Ile
225 230 235 240

Val Glu Tyr Tyr Ser Val Asn Arg Ala Leu Lys Val Ile Asp Met Val
245 250 255

Asp Ile Val Phe Leu Leu Ile Asp Val Gln Glu Lys Leu Thr Ser Gln
 260 265 270
 Asp Lys Lys Ile Ala His Tyr Val Thr Lys Lys Gly Lys Gly Ile Val
 275 280 285
 Ile Val Phe Ser Lys Trp Asp Leu Val Asp Glu Ser Lys Gly Tyr Phe
 290 295 300
 Glu Ala Leu Lys Ser His Val Lys Phe Phe Phe Pro Ile Leu Asn Phe
 305 310 315 320
 Ala Pro Ile Phe Arg Ile Ser Val His Lys Arg Ile Gly Leu Asp Ser
 325 330 335
 Leu Phe Lys Glu Ser Phe Lys Leu Lys Asp Gln Leu Glu Leu Lys Thr
 340 345 350
 Ser Thr Pro Asp Leu Asn Lys Met Leu Asn Leu Trp Ile Lys Asp Tyr
 355 360 365
 His Leu Asn Ile Ser His Lys Ile Lys Tyr Ile Thr Gln Val Ser Thr
 370 375 380
 Asn Pro Val Lys Phe Ile Leu Phe Ala Asn Lys Ile Lys Asn Phe Pro
 385 390 395 400
 Asn Ser Tyr Tyr Asn Tyr Leu Val Asn Asn Leu Arg Lys Ile Gly Tyr
 405 410 415
 Lys Asn Ile Pro Ile Leu Val Glu Leu Lys Glu Lys Ile Arg Asp Leu
 420 425 430

Lys

<210> 29
 <211> 924
 <212> DNA
 <213> *Borrelia burgdorferi*

<400> 29
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 tacaatgtaa aagatcaact aagatcaaaa cttgacttaa actccgtttt aatgcaaatt 240
 ccaattggat tagaagacaa acatattgga gttatagacc ttgtattaat gaaagcctac 300
 tattttgaag gaaaagatgg aacagaaata atagaaaaag aaataccctc agatctctta 360
 gaagaagcaa aaagcaaacg agaaataatg cttgatactc ttgctgactt taatgatgaa 420
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 aaaggagtaa atatattgaa tttggagcat ctcttagagc ttctcttagt ttattaaagt 600
 gtgctcgtgt taatgctctt tatgagggga gaatatttgt tttaccagaa gatgtcaaag 660
 ctgttgctta cagcgatta aggcatagaa ttacaccatc ttatgaggca gaggtagagg 720
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<210> 30
 <211> 198
 <212> PRT
 <213> *Borrelia burgdorferi*

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 Gly Ala Ile Leu Val Leu Asp Ser Val Ala Gly Val Gln Ser Gln Ser
 20 25 30
 Ile Thr Val Asp Arg Gln Leu Lys Arg Tyr Ser Val Pro Arg Leu Ala
 35 40 45
 Phe Val Asn Lys Cys Asp Lys Thr Gly Ala Asn Pro Tyr Asn Val Lys
 50 55 60
 Asp Gln Leu Arg Ser Lys Leu Asp Leu Asn Ser Val Leu Met Gln Ile
 65 70 75 80
 Pro Ile Gly Leu Glu Asp Lys His Ile Gly Val Ile Asp Leu Val Leu
 85 90 95
 Met Lys Ala Tyr Tyr Phe Glu Gly Lys Asp Gly Thr Glu Ile Ile Glu
 100 105 110
 Lys Glu Ile Pro Ser Asp Leu Leu Glu Glu Ala Lys Ser Lys Arg Glu
 115 120 125
 Ile Met Leu Asp Thr Leu Ala Asp Phe Asn Asp Glu Leu Met Glu Leu
 130 135 140
 His Met Glu Gly Lys Glu Val Pro Thr Glu Ile Ile Tyr Asn Ala Thr
 145 150 155 160
 Arg Thr Gly Thr Leu Ala Leu Lys Leu Cys Pro Val Phe Met Gly Ser
 165 170 175
 Ala Tyr Lys Asn Lys Gly Val Asn Ile Leu Asn Leu Glu His Leu Leu
 180 185 190
 Glu Leu Leu Leu Val Tyr
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<210> 31
 <211> 2082
 <212> DNA
 <213> *Borrelia burgdorferi*

<400> 31
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acaatagcat cagctgcaac tcacgttgaa tggaaagatt ttccgataaa tattattgat 240
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gatctcttag aagaagcaaa aagcaaacga gaaataatgc ttgatactct tgctgacttt 660
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aatgcaacta gaacaggaac attggcttta aaattatgcc ctgtatttat gggatctgct 780
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gctgaggtgc ctttaagcga aatgtttgga ttttcaacag tccttagatc ctctacccaa 1980
ggaaaagcag aattctcaat ggaattctta aggtatggaa aagttccaag cactatattt 2040
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<210> 32

<211> 693

<212> PRT

<213> *Borrelia burgdorferi*

<400> 32

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Ser Gly Lys Thr Thr Leu Thr Glu Arg Ile Leu Phe Tyr Cys Asn Lys
20 25 30

Ile His Ala Ile His Glu Val Lys Gly Lys Asp Gly Val Gly Ala Thr
35 40 45

Met Asp Ser Met Glu Leu Glu Arg Glu Arg Gly Ile Thr Ile Ala Ser
50 55 60

Ala Ala Thr His Val Glu Trp Lys Asp Phe Pro Ile Asn Ile Ile Asp
65 70 75 80

Thr	Pro	Gly	His	Val	Asp	Phe	Thr	Ile	Glu	Val	Glu	Arg	Ser	Leu	Arg	85	90	95
Val	Leu	Asp	Gly	Ala	Ile	Leu	Val	Leu	Asp	Ser	Val	Ala	Gly	Val	Gln	100	105	110
Ser	Gln	Ser	Ile	Thr	Val	Asp	Arg	Gln	Leu	Lys	Arg	Tyr	Ser	Val	Pro	115	120	125
Arg	Leu	Ala	Phe	Val	Asn	Lys	Cys	Asp	Lys	Thr	Gly	Ala	Asn	Pro	Tyr	130	135	140
Asn	Val	Lys	Asp	Gln	Leu	Arg	Ser	Lys	Leu	Asp	Leu	Asn	Ser	Val	Leu	145	150	155
Met	Gln	Ile	Pro	Ile	Gly	Leu	Glu	Asp	Lys	His	Ile	Gly	Val	Ile	Asp	165	170	175
Leu	Val	Leu	Met	Lys	Ala	Tyr	Tyr	Phe	Glu	Gly	Lys	Asp	Gly	Thr	Glu	180	185	190
Ile	Ile	Glu	Lys	Glu	Ile	Pro	Ser	Asp	Leu	Leu	Glu	Glu	Ala	Lys	Ser	195	200	205
Lys	Arg	Glu	Ile	Met	Leu	Asp	Thr	Leu	Ala	Asp	Phe	Asn	Asp	Glu	Leu	210	215	220
Met	Glu	Leu	His	Met	Glu	Gly	Lys	Glu	Val	Pro	Thr	Glu	Ile	Ile	Tyr	225	230	235
Asn	Ala	Thr	Arg	Thr	Gly	Thr	Leu	Ala	Leu	Lys	Leu	Cys	Pro	Val	Phe	245	250	255
Met	Gly	Ser	Ala	Tyr	Lys	Asn	Lys	Gly	Val	Gln	Leu	Leu	Leu	Asp	Ala	260	265	270
Val	Thr	Arg	Phe	Leu	Pro	Ser	Pro	His	Asp	Ile	Lys	Asn	Thr	Ala	Leu	275	280	285
Asp	Leu	Asn	Asn	Asn	Glu	Lys	Glu	Ile	Asp	Leu	Lys	Ile	Asp	Asn	Glu	290	295	300
Leu	Pro	Thr	Val	Ala	Leu	Ala	Phe	Lys	Leu	Glu	Asp	Gly	Gln	Tyr	Gly	305	310	315
Gln	Leu	Thr	Tyr	Val	Arg	Ile	Tyr	Gln	Gly	Ile	Leu	Lys	Lys	Gly	Gln	325	330	335
Glu	Leu	Ile	Asn	Ser	Arg	Thr	Ser	Lys	Lys	Phe	Lys	Val	Gly	Arg	Leu	340	345	350
Ile	Arg	Met	His	Ala	Asn	Asn	Thr	Glu	Asp	Ile	Glu	Phe	Gly	Gly	Ser	355	360	365
Gly	Asp	Ile	Val	Ala	Leu	Phe	Gly	Ile	Glu	Cys	Ala	Ser	Gly	Asp	Thr	370	375	380

Phe	Cys	Asp	Pro	Ser	Ile	Asn	Tyr	Ser	Met	Thr	Ser	Met	Phe	Ile	Pro	385	390	395	400
Asp	Pro	Val	Ile	Ser	Leu	Ser	Val	Lys	Pro	Lys	Asp	Lys	Lys	Ser	Ala	405	410	415	
Asp	Asn	Met	Ala	Lys	Ala	Leu	Gly	Arg	Phe	Thr	Lys	Glu	Asp	Pro	Thr	420	425	430	
Phe	Lys	Thr	Tyr	Val	Asp	Ile	Glu	Ser	Asn	Glu	Thr	Ile	Ile	Gln	Gly	435	440	445	
Met	Gly	Glu	Leu	His	Leu	Glu	Val	Tyr	Ile	Glu	Arg	Met	Lys	Arg	Glu	450	455	460	
Phe	Lys	Ala	Glu	Val	Glu	Thr	Gly	Met	Pro	Gln	Val	Ala	Tyr	Arg	Glu	465	470	475	480
Thr	Ile	Thr	Arg	Lys	Ala	Glu	Phe	Asn	Tyr	Thr	His	Lys	Lys	Gln	Ser	485	490	495	
Gly	Gly	Ala	Gly	Gln	Phe	Gly	Arg	Val	Ala	Gly	Phe	Met	Glu	Pro	Leu	500	505	510	
Asp	Lys	Glu	Gly	Glu	Thr	Tyr	Glu	Phe	Val	Asn	Leu	Ile	Lys	Gly	Gly	515	520	525	
Val	Ile	Pro	Thr	Glu	Tyr	Ile	Pro	Ser	Cys	Asp	Lys	Gly	Phe	Gln	Lys	530	535	540	
Ala	Met	Glu	Arg	Gly	Thr	Leu	Ile	Gly	Phe	Pro	Ile	Val	Asp	Ile	Lys	545	550	555	560
Ile	Thr	Ile	Asn	Asp	Gly	Gln	Tyr	His	Ile	Val	Asp	Ser	Ser	Asp	Ile	565	570	575	
Ala	Phe	Gln	Leu	Ala	Ala	Ile	Gly	Ala	Phe	Arg	Glu	Ala	Tyr	Glu	Lys	580	585	590	
Ala	Lys	Pro	Thr	Ile	Leu	Glu	Pro	Ile	Met	Lys	Val	Thr	Leu	Glu	Gly	595	600	605	
Pro	Thr	Glu	Phe	Gln	Gly	Asn	Met	Phe	Gly	Leu	Leu	Asn	Gln	Arg	Arg	610	615	620	
Gly	Ile	Ile	Thr	Gly	Ser	Leu	Glu	Asp	Gly	Ser	Phe	Ser	Lys	Val	Glu	625	630	635	640
Ala	Glu	Val	Pro	Leu	Ser	Glu	Met	Phe	Gly	Phe	Ser	Thr	Val	Leu	Arg	645	650	655	
Ser	Ser	Thr	Gln	Gly	Lys	Ala	Glu	Phe	Ser	Met	Glu	Phe	Leu	Arg	Tyr	660	665	670	
Gly	Lys	Val	Pro	Ser	Thr	Ile	Phe	Asp	Glu	Leu	Arg	Lys	Lys	Phe	Asn	675	680	685	

Asp Gln Asn Lys Ser
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<210> 33
<211> 908
<212> DNA
<213> *Borrelia burgdorferi*

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<210> 34
<211> 302
<212> PRT
<213> *Borrelia burgdorferi*

<400> 34
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20 25 30
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35 40 45
Asp Val Lys Met Leu Ser Asp Cys Ile Gly Ser Glu Val Val Asn Ser
50 55 60
Thr Leu Gln Met Lys Asp Gly Asp Val Val Leu Leu Glu Asn Val Arg
65 70 75 80
Phe Tyr Ala Glu Glu Glu Lys Asn Asp Lys Asn Phe Ala Lys Lys Leu
85 90 95
Ser Glu Asn Gly Asp Val Phe Val Asn Asp Ala Phe Gly Ala Ala His
100 105 110
Arg Ala His Ala Ser Thr Val Gly Val Ala Asp Tyr Leu Pro Ser Val
115 120 125

Gly Gly Phe Leu Met Glu Lys Glu Asp Lys Phe Leu Gly Gly Ile Leu
 130 135 140
 Lys Asn Pro Glu Arg Pro Phe Val Ser Ile Ile Gly Gly Ser Lys Val
 145 150 155 160
 Ser Ser Lys Ile Ala Val Leu Glu Ser Leu Leu Ser Lys Ser Asn Val
 165 170 175
 Val Val Ile Gly Gly Gly Met Ala Tyr Thr Phe Leu His Ser Glu Gly
 180 185 190
 Tyr Ser Ile Gly Lys Ser Leu Leu Glu Asp Glu Tyr Ile Gly Ile Ala
 195 200 205
 Ser Ser Phe Leu Lys Lys Ala Lys Glu Leu Gly Val Lys Val Ile Leu
 210 215 220
 Pro Leu Asp His Ile Val Ala Asp Asp Phe Asn Lys Asn Ser Ile Pro
 225 230 235 240
 Glu Tyr Ile Asp Ser Phe Asn Ile Pro Glu Asn Lys Ile Gly Met Asp
 245 250 255
 Ile Gly Ala Asn Thr Leu Lys Glu Ile Glu Asn Val Val Lys Thr Ala
 260 265 270
 Lys Thr Ile Ile Trp Asn Gly Pro Leu Gly Val Phe Glu Phe Asp Ser
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 Phe Ser Lys Gly Thr Ala Lys Val Ala Glu Met Val Ala Ser
 290 295 300

<210> 35

<211> 1182

<212> DNA

<213> *Borrelia burgdorferi*

<400> 35

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 ggaatggctt atactttttt gcattccgaa ggatattcta taggcaaata tcttttagag 720
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<210> 36
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 <213> *Borrelia burgdorferi*

<400> 36
 Met Ser Ile Lys Thr Val Lys Asp Phe Ser Ser Phe Ala Gly Lys Arg
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 Ala Leu Val Arg Cys Asp Phe Asn Val Pro Leu Lys Glu Gly Ser Ile
 20 25 30
 Ser Asp Asp Thr Arg Ile Arg Ala Ala Leu Ser Thr Ile Glu Tyr Leu
 35 40 45
 Lys Glu Arg Gly Ala Arg Ile Val Leu Val Ser His Leu Gly Arg Pro
 50 55 60
 Asp Gly Lys Lys Asn Pro Lys Tyr Ser Leu Lys Pro Val Ala Asn Arg
 65 70 75 80
 Leu Ser Glu Leu Leu Gly Gln Asp Val Lys Met Leu Ser Asp Cys Ile
 85 90 95
 Gly Ser Glu Val Val Asn Ser Thr Leu Gln Met Lys Asp Gly Asp Val
 100 105 110
 Val Leu Leu Glu Asn Val Arg Phe Tyr Ala Glu Glu Glu Lys Asn Asp
 115 120 125
 Lys Asn Phe Ala Lys Lys Leu Ser Glu Asn Gly Asp Val Phe Val Asn
 130 135 140
 Asp Ala Phe Gly Ala Ala His Arg Ala His Ala Ser Thr Val Gly Val
 145 150 155 160
 Ala Asp Tyr Leu Pro Ser Val Gly Gly Phe Leu Met Glu Lys Glu Asp
 165 170 175
 Lys Phe Leu Gly Gly Ile Leu Lys Asn Pro Glu Arg Pro Phe Val Ser
 180 185 190
 Ile Ile Gly Gly Ser Lys Val Ser Ser Lys Ile Ala Val Leu Glu Ser
 195 200 205
 Leu Leu Ser Lys Ser Asn Val Val Val Ile Gly Gly Gly Met Ala Tyr
 210 215 220
 Thr Phe Leu His Ser Glu Gly Tyr Ser Ile Gly Lys Ser Leu Leu Glu
 225 230 235 240

Asp Glu Tyr Ile Gly Ile Ala Ser Ser Phe Leu Lys Lys Ala Lys Glu
 245 250 255
 Leu Gly Val Lys Val Ile Leu Pro Leu Asp His Ile Val Ala Asp Asp
 260 265 270
 Phe Asn Lys Asn Ser Ile Pro Glu Tyr Ile Asp Ser Phe Asn Ile Pro
 275 280 285
 Glu Asn Lys Ile Gly Met Asp Ile Gly Ala Asn Thr Leu Lys Glu Ile
 290 295 300
 Glu Asn Val Val Lys Thr Ala Lys Thr Ile Ile Trp Asn Gly Pro Leu
 305 310 315 320
 Gly Val Phe Glu Phe Asp Ser Phe Ser Lys Gly Thr Ala Lys Val Ala
 325 330 335
 Glu Met Val Ala Ser Cys Ser Gly Leu Thr Val Val Gly Gly Gly Asp
 340 345 350
 Ser Val Ala Ala Val Asn Lys Phe Asn Leu Ser Asp Lys Ile Thr His
 355 360 365
 Val Ser Thr Gly Gly Gly Ala Ser Leu Glu Tyr Leu Glu Gly Arg Ile
 370 375 380
 Leu Pro Gly Ile Lys Val Leu Glu Asn
 385 390

<210> 37
 <211> 645
 <212> DNA
 <213> *Borrelia burgdorferi*

<400> 37
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 aaaaataata gattaaagga tttacaagat tttgaaaagt ttgtgtcggt taagaggact 180
 gcttatggcc ctagtccatt aatattcttt agtatcttaa aagaatacga acggtttgat 240
 gagatatttg cagcatagca agattcttac atgttaaagc ccccatatg ggggctgcta 300
 gattaattgc aggtagcagt tgcttgatct gcaaaattat ctatattgcc gccgctaaaa 360
 aacccttgaa cggtagtttt gaaggtgttt tttccttcat catttccatt acatttatca 420
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 ttatcaaatt ttccaacacc agttaaagcg gtttttaacc agtcaagttg tgttttttga 540
 tcatcagata gcttttctct aagcaggtct tcttttagatt tagatttagg tttttcttgt 600
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<210> 38
 <211> 85
 <212> PRT
 <213> *Borrelia burgdorferi*

<400> 38
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50					55					60						
Asn	Glu	Ile	Val	Arg	Glu	Ile	Lys	Asn	Val	Ile	Lys	Lys	His	Asn	Leu	
65					70					75					80	
Glu	Leu	Asp	Ile	Glu	Gln	Tyr	Pro	Ile	Ser	Ile	Glu	Gly	Gln	Tyr	Gly	
85					90					95						
Ile	Val	Asp	Tyr	Ile	Arg	Thr	Thr	Phe	Tyr	Ser	Thr	Ser	Thr	Gly	Tyr	
100					105					110						
Glu	Phe	Ser	Phe	Asp	Thr	Arg	Ile	Pro	Thr	Glu	Asn	Leu	Gln	Trp	Asn	
115					120					125						
Asn	Glu	Asn	Gly	Ser	Lys	Val	Thr	Asn	Thr	Val	Tyr	Gln	Met	Phe	Gly	
130					135					140						
Ser	Gly	Ile	Thr	Tyr	Val	Lys	Arg	Tyr	Ala	Leu	Val	Ala	Ala	Leu	Gly	
145					150					155					160	
Ile	Glu	Ser	Glu	Ile	Asp	Thr	Asp	Ala	Ala	Pro	Ile	Tyr	Asn	Asn	His	
165					170					175						
Glu	Asn	Glu	Asn	Ser	Met	Pro	Ser	Lys	Gln	Ser	Ser	Val	Asn	Gln	Lys	
180					185					190						
Gln	Glu	Gln	Lys	Arg	Glu	Gln	Lys	Gln	Glu	Ile	Asn	Gln	Ile	Gln	Lys	
195					200					205						
Asn	Asn	Thr	Ile	Gln	Asn	Gln	Lys	Arg	Asp	Ile	Lys	Gln	Glu	Gln	Lys	
210					215					220						
Lys	Asp	Arg	Leu	Tyr	Tyr	Tyr	Gly	Val	Phe	Lys	Glu	Ala	Leu	Ser	Asn	
225					230					235					240	
Ile	Lys	Asp	Trp	Val	Asn	Ser	Pro	Thr	Thr	Lys	Asp	Asn	Ile	Asn	Ser	
245					250					255						
Ile	Ile	Gln	Lys	Ile	Ser	Phe	Ile	Gln	Asn	Ile	Asp	Ser	Asn	Asn	Phe	
260					265					270						
Asp	Asp	Ile	Lys	Lys	Ile	Glu	Ser	Asp	Leu	Ile	Leu	Tyr	Phe	Glu	Lys	
275					280					285						
Asn	Ser	Asp	Phe	Lys	Ser	Val	Asn	Tyr	Trp	Ala	Glu	Ile	Ile	Lys	Asn	
290					295					300						
Tyr	Phe	Lys	Lys	Asn	Asn	Arg	Leu	Lys	Asp	Leu	Gln	Asp	Phe	Glu	Lys	
305					310					315					320	
Phe	Val	Ser	Phe	Lys	Arg	Thr	Ala	Tyr	Gly	Pro	Ser	Pro	Leu	Ile	Phe	
325					330					335						
Phe	Ser	Ile	Leu	Lys	Glu	Tyr	Glu	Arg	Phe	Asp	Glu	Ile	Phe	Ala	Ala	

340

345

350

<210> 41
 <211> 241
 <212> DNA
 <213> *Borrelia burgdorferi*

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 tatcctttta ttagatttgc aaatttaatt gaatttgaaa tttttaaaat ttaattgcag 180
 aaaaactttt tactgacaat caagttttta acaatttcaa caaacaagca agctttgatt 240
 a 241

<210> 42
 <211> 29
 <212> PRT
 <213> *Borrelia burgdorferi*

<400> 42
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 Glu Leu Ile Ile Val Lys Asn Lys Glu Leu Phe Val Ile
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<210> 43
 <211> 93
 <212> DNA
 <213> *Borrelia burgdorferi*

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 attgtcaaga ataaagaatt atttgattatt taa 93

<210> 44
 <211> 30
 <212> PRT
 <213> *Borrelia burgdorferi*

<400> 44
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 Asp Glu Leu Ile Ile Val Lys Asn Lys Glu Leu Phe Val Ile
 20 25 30

<210> 45
 <211> 356

<212> DNA
 <213> *Borrelia burgdorferi*

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 gatctaattg acaaaaatgt tgcaaatagt tttgcaaagt tttaaattaga ccttttgtca 180
 aagggtatta atataaaaga agtttcaata gaagagatta attttatttt atcaatttat 240
 tatataattt ctctgttga agcatcctcc aatcttgctc gttatactgg actttgttac 300
 ggcaagagaa tctctgaagg tttgagtcct aatgattttt attttaaaca taggag 356

<210> 46
 <211> 118
 <212> PRT
 <213> *Borrelia burgdorferi*

<400> 46
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 Asp Asp Phe Tyr Pro Leu Lys Ile Glu Ser Leu Gln Gly Lys Asn Leu
 20 25 30
 Ala Val Ile Lys Glu Leu Ser Glu Asp Leu Met Asp Lys Asn Val Ala
 35 40 45
 Asn Ser Phe Ala Lys Phe Lys Leu Asp Leu Leu Ser Lys Gly Ile Asn
 50 55 60
 Ile Lys Glu Val Ser Ile Glu Glu Ile Asn Phe Ile Leu Ser Ile Tyr
 65 70 75 80
 Tyr Ile Ile Ser Pro Val Glu Ala Ser Ser Asn Leu Ala Arg Tyr Thr
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 Gly Leu Cys Tyr Gly Lys Arg Ile Ser Glu Gly Leu Ser Leu Asn Asp
 100 105 110
 Phe Tyr Phe Lys His Arg
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<210> 47
 <211> 1491
 <212> DNA
 <213> *Borrelia burgdorferi*

<400> 47
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 ttaactttta ccaaaattca agaattagtt ttaactagaa aatgtaaaat ttatgatatt 120
 ttgcttgctt ataaaaataa ttatgagcta aataaagata tcaatggata tattgaattt 180
 tttgatgatt ctttagagat tgcaaaaagg tatgacgatt gtttaaaaaa ttgtgaatta 240
 gaagatttgc ctttaattgg tatgcttatt gcagtcaaag ataatatctc aattcaagat 300
 aaatctttta cttgtgcttc tgagatttta aaagggtata tttctcctta tgatgcgact 360
 gttattaaaa ggcttaagaa taaaggagca attttaattg gtagaaccaa tatggatgaa 420
 tttgccatgg gttctacttg tgaattttct tattacggtg caactttaaa tcctttaaat 480

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agagaatatg ttataggtgg tagttctgga ggctctgcag ctgtagttgc agcttttcaa 540
gcaccttttt cgcttggttag tgatactgga ggttctgtta ggctgcccgc atctttttca 600
ggaatttttg gttttaaaacc ttcttatgga ggtctttctc gctatgggct tgcattctat 660
gcttcgtctt ttgatcaaat aggatttttt tctcattcta ttgaagatat tgctttaatt 720
ttaaagcata cttgtggatc tgataaaatg gattctacta gtgtagacat ttttgatgat 780
ttttatcctt taaaaattga gtcgttgcaa ggtaaaaatt tagctgtaat caaagagctt 840
agcgaagatc taatggacaa aaatgttgca aatagttttg caaagtttaa attagacctt 900
ttgtcaaagg gtattaatat aaaagaagtt tcaatagaag agattaattt tattttatca 960
atattattata taatttctcc tgttgaagca tcctccaatc ttgctcgta tactggactt 1020
tgttacggca agagaatctc tgaaggtttg agtcttaatg atttttattt taaacatagg 1080
agcaatttct tgtcagaaga agttaaaagg cgtattgttc ttggaaatta tttgttatca 1140
gaaaggtagg attctaaata ttatgcaaaa gctttgtgaa ttcttcaaaa tttgattatt 1200
cctaaattta acaagctttt tgaaagctgt gattttatta ttacccaac aagctttggt 1260
aaacctttta gacttggttt ggattttgat gatcctgtta aaatgtatta ttcagatatt 1320
tgtactgtta ttgcaaatct tattggagcc cctgctattt cgcttcata ttctaaggat 1380
gaggaaggat tgtcaattgg gatgcaaat attgggcgta gcaaaaagga ttttgaactt 1440
ttaagttttt caaaaaatgt gattagggaa ttaggattga atggaatata a 1491

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<210> 48

<211> 496

<212> PRT

<213> *Borrelia burgdorferi*

<400> 48

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          20                      25                     30

Arg Lys Cys Lys Ile Tyr Asp Ile Leu Leu Ala Tyr Lys Asn Asn Tyr
          35                      40                     45

Glu Leu Asn Lys Asp Ile Asn Gly Tyr Ile Glu Phe Phe Asp Asp Ser
          50                      55                     60

Leu Glu Ile Ala Lys Arg Tyr Asp Asp Cys Leu Lys Asn Cys Glu Leu
          65                      70                     75                     80

Glu Asp Leu Pro Leu Ile Gly Met Leu Ile Ala Val Lys Asp Asn Ile
          85                      90                     95

Ser Ile Gln Asp Lys Ser Leu Thr Cys Ala Ser Glu Ile Leu Lys Gly
          100                     105                    110

Tyr Ile Ser Pro Tyr Asp Ala Thr Val Ile Lys Arg Leu Lys Asn Lys
          115                     120                    125

Gly Ala Ile Leu Ile Gly Arg Thr Asn Met Asp Glu Phe Ala Met Gly
          130                     135                    140

Ser Thr Cys Glu Phe Ser Tyr Tyr Gly Ala Thr Leu Asn Pro Leu Asn
          145                     150                    155                    160

Arg Glu Tyr Val Ile Gly Gly Ser Ser Gly Gly Ser Ala Ala Val Val
          165                     170                    175

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Ala	Ala	Phe	Gln	Ala	Pro	Phe	Ser	Leu	Gly	Ser	Asp	Thr	Gly	Gly	Ser		
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Val	Arg	Leu	Pro	Ala	Ser	Phe	Ser	Gly	Ile	Leu	Gly	Phe	Lys	Pro	Ser		
		195					200					205					
Tyr	Gly	Gly	Leu	Ser	Arg	Tyr	Gly	Leu	Ala	Ser	Tyr	Ala	Ser	Ser	Phe		
	210					215					220						
Asp	Gln	Ile	Gly	Phe	Phe	Ser	His	Ser	Ile	Glu	Asp	Ile	Ala	Leu	Ile		
225					230					235					240		
Leu	Lys	His	Thr	Cys	Gly	Ser	Asp	Lys	Met	Asp	Ser	Thr	Ser	Val	Asp		
				245					250					255			
Ile	Phe	Asp	Asp	Phe	Tyr	Pro	Leu	Lys	Ile	Glu	Ser	Leu	Gln	Gly	Lys		
			260					265					270				
Asn	Leu	Ala	Val	Ile	Lys	Glu	Leu	Ser	Glu	Asp	Leu	Met	Asp	Lys	Asn		
		275					280					285					
Val	Ala	Asn	Ser	Phe	Ala	Lys	Phe	Lys	Leu	Asp	Leu	Leu	Ser	Lys	Gly		
	290					295					300						
Ile	Asn	Ile	Lys	Glu	Val	Ser	Ile	Glu	Glu	Ile	Asn	Phe	Ile	Leu	Ser		
305					310					315					320		
Ile	Tyr	Tyr	Ile	Ile	Ser	Pro	Val	Glu	Ala	Ser	Ser	Asn	Leu	Ala	Arg		
				325					330					335			
Tyr	Thr	Gly	Leu	Cys	Tyr	Gly	Lys	Arg	Ile	Ser	Glu	Gly	Leu	Ser	Leu		
			340					345					350				
Asn	Asp	Phe	Tyr	Phe	Lys	His	Arg	Ser	Asn	Phe	Leu	Ser	Glu	Glu	Val		
		355					360					365					
Lys	Arg	Arg	Ile	Val	Leu	Gly	Asn	Tyr	Leu	Leu	Ser	Glu	Arg	Tyr	Asp		
	370					375					380						
Ser	Lys	Tyr	Tyr	Ala	Lys	Ala	Cys	Glu	Ile	Leu	Gln	Asn	Leu	Ile	Ile		
385					390					395				400			
Pro	Lys	Phe	Asn	Lys	Leu	Phe	Glu	Ser	Cys	Asp	Phe	Ile	Ile	Thr	Pro		
				405					410					415			
Thr	Ser	Phe	Val	Lys	Pro	Phe	Arg	Leu	Gly	Leu	Asp	Phe	Asp	Asp	Pro		
			420					425					430				
Val	Lys	Met	Tyr	Tyr	Ser	Asp	Ile	Cys	Thr	Val	Ile	Ala	Asn	Leu	Ile		
		435					440					445					
Gly	Ala	Pro	Ala	Ile	Ser	Leu	Pro	Tyr	Ser	Lys	Asp	Glu	Glu	Gly	Leu		
	450					455					460						
Ser	Ile	Gly	Met	Gln	Ile	Ile	Gly	Arg	Ser	Lys	Lys	Asp	Phe	Glu	Leu		
465					470					475				480			

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485 490 495

<210> 49
<211> 436
<212> DNA
<213> *Borrelia burgdorferi*

<400> 49
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atcattgatt ctggagaaga ttagaaaact attttgcaag ctttgttgta tgaattcgga 180
tacgcataca ctttctcttc agtcggcaaa ctacaaatac ttccaatttg gaaaagcgaa 240
gttattacta aagaaattga aatttgact gtggatgctg aaagttatgt tatgtcaaaa 300
agtagctcca gtagctacga ttcaactaaa gttatttgga gagaaggcaa attccaaagc 360
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accgatggtg cactgt 436

<210> 50
<211> 145
<212> PRT
<213> *Borrelia burgdorferi*

<400> 50
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20 25 30
Ile Leu Asp Lys Val Pro Ala Val Ile Ile Asp Ser Gly Glu Asp Val
35 40 45
Glu Thr Ile Leu Gln Ala Leu Leu Tyr Glu Phe Gly Tyr Ala Tyr Thr
50 55 60
Phe Ser Ser Val Gly Lys Leu Gln Ile Leu Pro Ile Trp Lys Ser Glu
65 70 75 80
Val Ile Thr Lys Glu Ile Glu Ile Cys Thr Val Asp Ala Glu Ser Tyr
85 90 95
Val Met Ser Lys Ser Ser Ser Ser Ser Tyr Asp Ser Thr Lys Val Ile
100 105 110
Trp Arg Glu Gly Lys Phe Gln Ser Lys Glu Glu Ala Met Ser Lys Lys
115 120 125
Arg Pro Leu Tyr Ser Ala Pro Ile Asn Val Ala Gly Thr Asp Gly Ala
130 135 140

Leu
145

<210> 51
<211> 2691
<212> DNA
<213> *Borrelia burgdorferi*

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actgaagaaa tctcaaatcc caaagaagat acatcggaag attgtacttc tttggggcct 180
gatattgtat tctacacgga cgaggggtcaa atttttgaac ttaccctttt tgttgacact 240
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<210> 52
 <211> 896
 <212> PRT
 <213> *Borrelia burgdorferi*

<400> 52

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			20				25						30		
Gln	Glu	Thr	Glu	Lys	Gly	Ala	Glu	Thr	Glu	Glu	Ile	Ser	Asn	Pro	Lys
		35					40					45			
Glu	Asp	Thr	Ser	Glu	Asn	Cys	Thr	Ser	Leu	Gly	Leu	Asp	Ile	Val	Phe
	50					55					60				
Tyr	Thr	Asp	Glu	Gly	Gln	Ile	Phe	Glu	Leu	Thr	Pro	Phe	Val	Asp	Thr
	65				70					75					80
Thr	Ser	Ile	Val	Leu	Glu	Glu	Lys	Ile	Val	Asp	Pro	Ser	Leu	Lys	Thr
			85						90					95	
Ala	Ala	Ser	Thr	Phe	Ser	Phe	Ser	Val	Ser	Gly	Leu	Ser	Glu	Glu	Phe
			100					105					110		
Leu	Asn	Phe	Leu	Phe	Phe	Arg	Asn	Glu	Asp	Ile	Phe	Val	Lys	Val	Asn
		115					120					125			
Asp	Lys	Asn	Asn	Pro	Val	Phe	Arg	Gly	Ile	Leu	Glu	Lys	Phe	Phe	Ser
	130					135					140				
Arg	Asp	Leu	Phe	Asn	Ser	Thr	Lys	Ser	Val	Ser	Phe	Thr	Val	Asn	Asp
	145				150					155					160
Tyr	Ser	Ser	Leu	Leu	Lys	Ile	Ala	Phe	Glu	Asn	Pro	Val	Gln	Phe	Pro
			165						170					175	
Ile	Asn	Phe	Leu	Pro	Asp	Trp	Leu	Phe	Val	Tyr	Asn	Pro	Leu	Ala	Lys
			180					185					190		
Glu	Leu	Ser	Leu	Val	His	Leu	Ile	Ile	Glu	Lys	Thr	Lys	Leu	Lys	Asp
		195					200					205			
Leu	Ile	Asp	Asp	Asp	Ala	Ser	Glu	Ala	Ile	Leu	Asp	Lys	Val	Pro	Ala
	210					215					220				
Val	Ile	Ile	Asp	Ser	Gly	Glu	Asp	Val	Glu	Thr	Ile	Leu	Gln	Ala	Leu
	225				230					235					240
Leu	Tyr	Glu	Phe	Gly	Tyr	Ala	Tyr	Thr	Phe	Ser	Ser	Val	Gly	Lys	Leu
				245					250					255	
Gln	Ile	Leu	Pro	Ile	Trp	Lys	Ser	Glu	Val	Ile	Thr	Lys	Glu	Ile	Glu
			260					265					270		

Ile Cys Thr Val Asp Ala Glu Ser Tyr Val Met Ser Lys Ser Ser Ser
 275 280 285
 Ser Ser Tyr Asp Ser Thr Lys Val Ile Trp Arg Glu Gly Lys Phe Gln
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 Ser Lys Glu Glu Ala Met Ser Lys Lys Arg Pro Leu Tyr Ser Ala Pro
 305 310 315 320
 Ile Asn Val Ala Gly Thr Asp Gly Ala Leu Tyr Val Ala Val Leu Gln
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 Lys Gly Val Val Tyr Pro Asp Phe Ala Asp Lys Val Gly Ser Ser Val
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 Phe Lys Arg Arg Glu Val Trp His Asp His Tyr Ala Ile Asn Glu His
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 385 390 395 400
 Ser Ser Ile Lys Leu Glu Asn Lys Glu Tyr Phe Pro Thr Lys Ala Lys
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 420 425 430
 His Phe Asp Ile Tyr Gly Asp Val Phe Tyr Thr Ile Ala Gln Asn Val
 435 440 445
 Leu Gln Thr Asp Asn Ala Asp Asp Phe Tyr Ser Lys Lys Phe Glu Tyr
 450 455 460
 Thr Thr Arg Phe Ile Phe Ser Glu Asp Ser Ala Leu Arg Leu Phe Glu
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 Phe Leu Thr Asn Leu Arg Val Lys Gly His Thr Ile Val Asn Phe Arg
 485 490 495
 Ser Met Gln Asn Leu Asn Ile Thr Asp Phe Val Lys Leu Arg Leu Asp
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 Asn Ile Gly Ile Asp His Phe Phe Leu Ile Leu Ser Lys Lys Ile Thr
 515 520 525
 Asn Phe Asp Leu Asp Ile Lys Leu Tyr Glu Tyr Glu Gly Ile Thr Trp
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 Gly Asp Tyr Thr His Tyr Glu Tyr Leu Thr Thr Ser Thr Lys Ile Gly
 545 550 555 560
 Ile Ser Asp Tyr Leu Ser Gly Ala His Lys Val Val Ile Ala Pro Phe
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Asn	Tyr	Asp	Gly	Ala	Glu	Thr	Tyr	Gln	Phe	Lys	Ala	Ser	Gly	Phe	Lys	580	585	590
Asp	Glu	Asn	Thr	Leu	Asn	Gly	Ser	Ile	Glu	Phe	Ala	Lys	Gln	Ala	Gly	595	600	605
Leu	Asn	Lys	Ile	Lys	Leu	Leu	Lys	Gly	Asp	Phe	Tyr	Ile	Tyr	Asp	Gln	610	615	620
Val	Lys	Leu	Asn	Asn	Leu	Glu	Ile	Glu	Gly	Asp	Asp	Glu	Val	Phe	Ile	625	630	635
Arg	Ser	Thr	Gly	Phe	Ser	Lys	His	Ile	Phe	Thr	Ser	Glu	Lys	Ser	Phe	645	650	655
Arg	Leu	Ser	Gly	Val	Asn	Ile	Cys	Gln	Gln	Pro	Met	Ser	Glu	Leu	Tyr	660	665	670
Ile	Asn	Gly	Gly	Asp	Leu	Asn	Gln	Gln	Glu	Leu	Ala	Pro	Tyr	Leu	Glu	675	680	685
Asp	Lys	Ser	Phe	Thr	Gln	Pro	Ala	Val	Val	Val	Leu	Cys	Ser	Ser	Tyr	690	695	700
Ser	Leu	Gln	Glu	Glu	Ala	Arg	Ser	Ser	Val	Tyr	Val	Thr	Asp	Ala	Ser	705	710	715
Phe	Val	Tyr	Ile	Lys	Asn	Val	Thr	Phe	Thr	Cys	Ala	Leu	Asn	Lys	Ala	725	730	735
Leu	His	Phe	Lys	Lys	Thr	Lys	Lys	Ile	Leu	Leu	Glu	Asp	Val	Asn	Phe	740	745	750
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Leu	Ile	Asn	Val	Asn	Ala	Gln	Gly	Ser	Lys	Thr	Ala	Ser	Val	Ala	Asn	770	775	780
Gly	Leu	Asn	Ala	Ile	Ile	Arg	Glu	Ser	Phe	Phe	Thr	Asn	Asn	Thr	Asn	785	790	795
Ala	Leu	Lys	Leu	Ser	Asn	Phe	Ser	Ser	Leu	Lys	Ile	Thr	Asp	Thr	Gln	805	810	815
Phe	Ile	Lys	Asn	Ser	Gly	Thr	Ala	Leu	His	Leu	Gln	Asp	Ile	Thr	Ser	820	825	830
Ala	Arg	Leu	Ser	Asn	Asn	Thr	Phe	Thr	Glu	Asn	Lys	Val	Gly	Leu	Glu	835	840	845
Asn	His	Ala	Phe	Asp	Leu	Ile	Val	Arg	Asp	Thr	Phe	Val	Lys	Asn	Thr	850	855	860
Leu	Ala	Leu	Asn	Leu	Ala	Arg	Lys	Ser	Asn	Ala	Gly	Val	Arg	Thr	Leu	865	870	875

Asp Leu Ser Thr Tyr Met Glu Asn Thr Lys Asp Lys Gln Glu Val Ala
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<211> 526
<212> DNA
<213> *Borrelia burgdorferi*

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tctttcctaa ataacacaaa attcatgaca gacaccttgc tgtaaatatt tattagtgtg 420
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<211> 175
<212> PRT
<213> *Borrelia burgdorferi*

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Leu Phe Ile Ser Ser Phe Ala Pro Leu Gln Met Glu Asn Ile Ile Phe
35 40 45
Ser Phe Leu Lys Lys Glu Lys Ile Asn Asn Ser Gly Lys Leu Lys Ile
50 55 60
Phe Asn Tyr Thr Asp Lys Glu Val Glu Glu Glu Ile His Lys Val Gln
65 70 75 80
Lys Glu Ile Lys Ser Lys Ile Leu Asn Glu Ser Leu Thr Asn Glu Ala
85 90 95
Ile Tyr Thr Glu Asn Asn Leu Lys Asp Ile Tyr Phe Ala Ile Ile Leu
100 105 110
Ser Leu Ser Pro Ser Leu Ile Phe Ser Phe Leu Asn Asn Thr Lys Phe
115 120 125
Met Thr Asp Thr Leu Leu Leu Ile Phe Ile Ser Val Ala Ile Tyr Ile
130 135 140

Pro Ile Met Leu Lys Ile Asn Tyr Lys Cys Leu Ser Phe Phe Val Tyr
 145 150 155 160

Ala Ala Leu Met Ile Ser Ile Ile Leu Pro Leu Asp Leu Glu Ile
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<210> 55

<211> 2322

<212> DNA

<213> *Borrelia burgdorferi*

<400> 55

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<210> 56

<211> 773

<212> PRT

<213> Borrelia burgdorferi

<400> 56

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Pro Leu Glu Thr Glu Asn Ser Lys Ser Ile Ile Tyr Ile Ile Glu Lys
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Gln Lys Ile Glu Glu Asn Gln Ile Leu Ser Lys Asn Ser Asn Ile Glu
      50              55              60

Leu Tyr Thr Tyr Ser Pro Ile Ser Gly Ile Val Glu Lys Ile Tyr Thr
      65              70              75              80

Ala Asn Phe Pro Asp Gly Lys Asn Leu Lys Ser Ala Leu Ile Lys Phe
      85              90              95

Gln Gly Lys Ile Lys Thr Glu Lys Thr Pro Ile Glu Glu Gly Ala Ser
      100              105              110

Arg Glu Lys Thr Leu Glu Lys Leu Ile Gln Leu Gly Ile Pro Trp Phe
      115              120              125

Asn Glu Asn Ser Leu Phe Gln Phe Ile Asn Lys Cys Lys Lys Ile Asp
      130              135              140

Lys Met Ile Leu Leu Thr Asn Gly Lys Asp Ala Phe Thr Asn Ile Ser
      145              150              155              160

Glu Ala Leu Met Ala Glu Lys Leu Glu Glu Ile Phe Ser Gly Phe Gln
      165              170              175

Ile Ile Asp Lys Ile Phe Lys Phe Lys Glu Ile Ile Ile Ile Ile Ser
      180              185              190

Asn Lys Asp Lys Leu Lys Lys Glu Phe Glu Lys Leu Ser Ile Phe Lys
      195              200              205

Asn Arg Lys Ile Lys Ile Lys Ser Leu Glu Asn Ala Tyr Pro Tyr Thr
      210              215              220

Asn His Glu Met Ile Met His Phe Leu Tyr Asn Asn Lys Asn Thr Lys
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Asp Asp Ile Asn Pro His Asn Asn Ile Leu Leu Ala Asn Ile Glu Asp
      245              250              255

Leu Tyr Asn Ala Asn Leu Val Ile Lys Asn Asn Asn Pro Tyr Lys Glu
      260              265              270

Lys Phe Val Ala Ile Asn Gly Asn Lys Lys Ile Lys Ser Arg Ile Leu
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 Asp Thr Lys Lys Tyr Glu Ile Phe Leu Asn Asn Pro Ala Asn Lys Ile
 305 310 315 320
 Lys Ile Asp Thr Leu Asn Ile Pro Ile Thr Arg Asp Ile Tyr Ser Leu
 325 330 335
 Thr Ile Leu Lys Lys Lys Ser Ile Tyr Asp Lys Ile Lys Ala Leu Phe
 340 345 350
 Ile Ser Ser Phe Ala Pro Leu Gln Met Glu Asn Ile Ile Phe Ser Phe
 355 360 365
 Leu Lys Lys Glu Lys Ile Asn Asn Ser Gly Lys Leu Lys Ile Phe Asn
 370 375 380
 Tyr Thr Asp Lys Glu Val Glu Glu Glu Ile His Lys Val Gln Lys Glu
 385 390 395 400
 Ile Lys Ser Lys Ile Leu Asn Glu Ser Leu Thr Asn Glu Ala Ile Tyr
 405 410 415
 Thr Glu Asn Asn Leu Lys Asp Ile Tyr Phe Ala Ile Ile Leu Ser Leu
 420 425 430
 Ser Pro Ser Leu Ile Phe Ser Phe Leu Asn Asn Thr Lys Phe Met Thr
 435 440 445
 Asp Thr Leu Leu Leu Ile Phe Ile Ser Val Ala Ile Tyr Ile Pro Ile
 450 455 460
 Met Leu Lys Ile Asn Tyr Lys Cys Leu Ser Phe Phe Val Tyr Ala Ala
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 485 490 495
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 Val Leu Asn Phe Pro Val Ser Phe Lys Gln Ala Tyr Gln Glu Glu Leu
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 Lys Asn Ser Asn Ser Ile Ile Pro Thr Trp Asn Glu Ile Ile Glu Thr
 545 550 555 560
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Phe Ser Ala Phe Asn Ile Ile Val Thr Arg Phe His Ile Glu Ser Leu
595 600 605
Leu Gly Val Asn Asn Glu Lys Lys Ile Ser Pro Ile Leu Leu Tyr Phe
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Gly Leu Leu Leu Ile Val Gly Lys Tyr Ile Ile Asn Lys Leu Ile Pro
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Leu Ser Phe Tyr Ile Ser Leu Met Ala Ile Ser Tyr Ile Ala His Asn
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Ile Gly Met Leu Asn His Ile Ser Ser Asp Met Leu Thr Leu Leu Ile
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Ser Pro Ile Pro Met Leu Leu Ile Phe Thr Met Ala Thr Glu Leu Gln
675 680 685
Ile Thr Pro His Phe Lys Phe Glu Gln Ile Leu Tyr Gly Ser Ile Leu
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Ala Phe Ile Tyr Phe Leu Thr Leu Ser Tyr Ile Pro Phe Glu Thr Leu
705 710 715 720
Ser Val Ile Ile Ser Ile Phe Ile Leu Gln Thr Ser Ser Asn Leu Ile
725 730 735
Lys Lys Tyr Ser Leu Thr Phe Lys Ile Lys Lys Ile Met His Val Leu
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Asp Ile Ile Lys Leu
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<211> 628
<212> DNA
<213> *Borrelia burgdorferi*

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<210> 58

<211> 209
 <212> PRT
 <213> Borrelia burgdorferi

<400> 58

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Ile Ile Leu Glu Ser Asn Ile Phe Asn Thr Gly Gln Lys Ile Asn Lys
          20             25             30

Ala Phe Glu Ser Ser Lys Thr Lys Ala Ile Asp Ser Phe Val Glu Ile
          35             40             45

Glu Lys Asn Ser His Val Val His Ile Asn His Gly Ile Gly Ile Phe
          50             55             60

Arg Gln Ile Lys Arg Ile Lys Thr Ser Ser Leu Glu Lys Asp Tyr Ile
          65             70             75             80

Glu Ile Glu Tyr Ala Glu Gly Glu Lys Leu Phe Ile Pro Ile Glu Gln
          85             90             95

Thr Asn Leu Ile Gln Lys Tyr Ile Gly Ser Asp Pro Lys Asn Ile Lys
          100            105            110

Leu Asp Lys Ile Ser Ser Lys Thr Trp Ile Lys Asn Lys Ala Asn Ala
          115            120            125

Lys Lys Arg Ile Glu Glu Ile Ala Asp Lys Leu Ile Glu Leu Tyr Ser
          130            135            140

Lys Arg Glu Ser Ile Lys Gly Ile Lys Tyr Pro Glu Asp Asn Glu Leu
          145            150            155            160

Gln Leu Leu Phe Glu Ser Glu Phe Pro Tyr Asp Glu Thr Pro Asp Gln
          165            170            175

Ile Arg Ala Ile Lys Glu Ile Lys Glu Asp Met Met Ser Phe Lys Val
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Met Asp Arg Leu Leu Cys Gly Asp Val Gly Phe Gly Lys Thr Glu Val
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Ala

<210> 59
 <211> 3378
 <212> DNA
 <213> Borrelia burgdorferi

<400> 59

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<211> 1125
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 <213> Borrelia burgdorferi

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Thr	Gly	Tyr	Glu	Gly	Phe	Phe	Lys	Ala	Phe	Leu	Ile	Lys	Lys	Ile	Lys		
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Glu	Tyr	Ser	Lys	Thr	Gly	Lys	Ile	Ile	Leu	Ile	Val	Lys	Asp	Glu	His		
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Phe	Glu	Leu	Asn	Tyr	Phe	Ser	Pro	Leu	Val	Tyr	Lys	Gly	Ile	Gly	Ser		
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Lys	Ser	Thr	Ile	Phe	Asn	Glu	Arg	Ile	Lys	Phe	Leu	Phe	Asn	Phe	Tyr		
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Gln	Glu	Tyr	Glu	Lys	Leu	Tyr	Lys	Glu	Ala	Glu	Glu	Ala	Gly	Lys	Asn
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Lys	Ser	Asp	Val	Leu	Phe	Ser	Lys	Ile	Lys	Ser	Leu	Lys	Ser	Lys	Glu
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Ile	Phe	Lys	Glu	Leu	Pro	Lys	Val	Ser	Ile	Glu	Val	Leu	Lys	Ile	Ser
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Glu	Gly	Glu	Lys	Leu	Phe	Ile	Pro	Ile	Glu	Gln	Thr	Asn	Leu	Ile	Gln
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Cys	Gly	Asp	Val	Gly	Phe	Gly	Lys	Thr	Glu	Val	Ala	Met	Arg	Ala	Ala
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Phe	Lys	Ala	Val	Met	Gly	Asn	Lys	Gln	Val	Ile	Val	Leu	Ser	Pro	Thr
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Lys	Glu	Lys	Leu	Lys	Glu	Ile	Arg	Ile	Ser	Val	Asp	Cys	Leu	Ala	Leu
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Ala	Glu	Leu	Lys	Ile	Leu	Ala	Lys	Asp	Leu	Asn	Ile	Thr	Lys	Leu	Lys
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Ile	Leu	Asn	Pro	Ser	Tyr	Gln	Lys	Ser	Ile	Phe	Leu	Ser	Phe	Lys	Asn
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Asp Glu Gln Phe Thr Tyr His Tyr Ile Lys Asn Glu Ala Ile Ile Glu
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Leu Ile Arg Ile Trp Asn Lys Asn Asn Arg Gln Asn Ser Lys Leu Ser
65 70 75 80
Ala Leu Gln Leu Ser Gly Ala Arg Asp Asn Ala Tyr Thr Ser Ala Ile
85 90 95
Glu Cys Leu Leu Lys Arg Phe Val Asp Arg Gly Leu Ile Ile Glu Tyr
100 105 110
Lys Asn Leu Arg Leu Thr Leu Ser Pro Thr Pro Gln Leu Lys Leu Glu
115 120 125
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 <213> *Borrelia burgdorferi*

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Lys Ile Lys Val Asn Lys Asp Ala Ala Ser Tyr Lys Ile Leu Asn Leu
      35               40              45

Thr Val Asn Asn Tyr Glu Lys Gln Ile Glu Thr Leu Glu Lys Glu Asn
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Gly Asn Gly Glu Asp Gln Phe Gly Lys Glu Lys Thr Leu Leu Lys Thr
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Ala Met Ser Asn Phe Phe Asn Ser Ser Glu Glu Ser Leu Lys Ser Ala
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Asp Leu Phe Ile Tyr Lys Asp Lys Pro Glu Glu Leu Lys Asn Tyr Leu
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Lys Val His Arg His Thr Phe Val Val Leu Ile Asn Thr Glu Gly Asp
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Ala Ser Asp Asp Gly Leu Lys Ile Tyr Lys Asp Asp Tyr Asn Lys Phe
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Lys Lys Pro Ser Thr Phe Phe Val Phe Ser Thr Lys Glu Gln Glu Ile
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 Gln Tyr Leu His Gln Ala Ser Ile Phe His Ala Val Asn Pro Tyr Gly
 195 200 205
 Met Pro Leu Ala Ala Thr Pro Leu Val Asp Asp Thr Val Ile Gly Lys
 210 215 220
 Leu Arg Thr Ala Lys Ile Asn Phe Tyr Ser Leu Leu Asn Glu Thr Gly
 225 230 235 240
 Leu Asp Gly Val Pro Ala Phe Lys Glu Gly Val Asp Leu Ala Gly Gly
 245 250 255
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 260 265 270
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 275 280 285
 Leu Ser Ala Leu Gln Leu Ser Gly Ala Arg Asp Asn Ala Tyr Thr Ser
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 305 310 315 320
 Glu Tyr Lys Asn Leu Arg Leu Thr Leu Ser Pro Thr Pro Gln Leu Lys
 325 330 335
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<211> 473

<212> DNA

<213> *Borrelia burgdorferi*

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 35 40 45
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 Arg Lys Ile Tyr Tyr Lys Ile Ser Lys Phe Glu Leu Glu Lys Lys Val
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 Asp Arg Ala

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 <211> 1833
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tctattccta atattttagt tcaatatgaa aatactctta ttaacttttt tcaatcaaga 1620
agaagtagga caataaattc tcttgaatct gacttatacg caactattgc ctgtagaaag 1680
gctgtcaaaa gaaatgacat gctaagcgt gaatttagta aatttttaat aaatgaattt 1740
tttaaactag aaatcaaaca ttgtcctcat ggacgaaaaa tttattacaa aatatctaaa 1800
tttgaacttg aaaaaaaagt tgacagagca taa 1833

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<210> 68

<211> 610

<212> PRT

<213> *Borrelia burgdorferi*

<400> 68

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Met Asn Lys Ile Arg Phe Leu Asp Lys Tyr Leu Val Gln Lys Ile Ala
  1             5             10             15

```

```

Ala Gly Glu Ser Ile Asp Arg Pro Cys Ser Ile Leu Arg Glu Leu Leu
          20             25             30

```

```

Asp Asn Ser Ile Asp Ser Gly Ala Thr Lys Ile Glu Val Phe Leu Glu
      35             40             45

```

```

Glu Gly Gly Ile Gln Lys Ile Leu Ile Ile Asp Asn Gly Ser Gly Ile
      50             55             60

```

```

Ser Lys Glu Asp Leu Lys Ile Cys Tyr Leu Pro His Thr Thr Ser Lys
      65             70             75             80

```

```

Ile Ser Ser Glu Glu Asp Leu Arg Lys Ile Glu Thr Leu Gly Phe Arg
          85             90             95

```

```

Gly Glu Ala Leu Ser Ser Ile Ala Ile Cys Ser Asn Ile Ser Ile Thr
      100            105            110

```

```

Ser Ser Thr Thr Ser Asn Glu Ser Tyr Gln Ile Glu Val Glu Asn Gly
      115            120            125

```

```

Ile Glu Lys Cys Phe Lys Lys Gln Pro Ala Ile Asn Gly Thr Ile Val
      130            135            140

```

```

Asp Val Thr Lys Ile Phe His Asn Phe Pro Ala Arg Lys Arg Phe Leu
      145            150            155            160

```

```

Lys Gln Glu Pro Ile Glu Thr Lys Met Cys Leu Lys Val Leu Glu Glu
          165            170            175

```

```

Lys Ile Ile Thr His Pro Glu Ile Asn Phe Glu Ile Asn Leu Asn Gln
          180            185            190

```

```

Lys Leu Arg Lys Ile Tyr Phe Lys Glu Ser Leu Ile Asp Arg Val Gln
      195            200            205

```

```

Asn Val Tyr Gly Asn Val Ile Glu Asn Asn Lys Phe Arg Val Leu Lys
      210            215            220

```

Lys Glu His Asp Asn Ile Lys Ile Glu Ile Phe Leu Ala Pro Asp Asn
 225 230 235 240
 Phe Ser Lys Lys Ser Lys Arg His Ile Lys Thr Phe Val Asn Arg Arg
 245 250 255
 Pro Ile Asp Gln Lys Asp Leu Leu Glu Ala Ile Thr Asn Gly His Ser
 260 265 270
 Arg Ile Leu Ser Pro Gly Asn Phe Pro Ile Cys Tyr Leu Phe Leu Glu
 275 280 285
 Ile Asn Pro Glu Tyr Ile Asp Phe Asn Val His Pro Gln Lys Lys Glu
 290 295 300
 Val Arg Phe Tyr Asn Leu Pro Phe Leu Phe Lys Leu Ile Ser Asp Asn
 305 310 315 320
 Ile Asn Asn Phe Phe Asp Lys Asn Ile Asn Asn Tyr Gln Asp Ile Ile
 325 330 335
 Ile Lys Arg Gln Leu Thr Glu Asp Asp His Leu Ile Glu Met Thr Asn
 340 345 350
 Gln Pro Glu Asn Phe Asn Lys Ile Asn Thr Tyr Asp Ile Pro Gln Asn
 355 360 365
 Asn Asn Leu Glu Thr Glu Asp Val Asn Glu Pro Asn Lys Asn Thr Thr
 370 375 380
 Gln Ser Asn Ile Asp Leu Arg Arg Tyr Asn Ser Ile Ile Gln Asn Arg
 385 390 395 400
 Pro Thr Leu Arg Glu Asn Ile Gly Asn Ile Phe Ser Asp Asn Phe Leu
 405 410 415
 Glu Phe Glu Glu Pro Pro Asn Lys Asn Glu Lys Glu Glu Ile Lys Phe
 420 425 430
 Asn Tyr Ile Gly Gln Ile Phe Ser Glu Phe Leu Ile Val Glu Lys Ile
 435 440 445
 Asn Glu Ile Tyr Phe Ile Asp Gln His Ala Val His Glu Lys Ile Ile
 450 455 460
 Tyr Glu Lys Leu Arg Asn Ser Lys Lys Asn Val Gln Lys Leu Leu Val
 465 470 475 480
 Pro Ile Glu Phe Thr Val Val Asp Lys Asn Ile Glu Glu Ile Ile Asp
 485 490 495
 Ser Glu Ile Glu Glu Tyr Lys Gln Met Asp Ile Ile Ile Ser Lys Ile
 500 505 510
 Gly Pro Lys Lys Tyr Gln Leu Glu Ser Ile Pro Asn Ile Cys Ser Gln
 515 520 525

Tyr Glu Asn Thr Leu Ile Asn Phe Phe Gln Ser Arg Arg Ser Arg Thr
 530 535 540

Ile Asn Ser Leu Glu Ser Asp Leu Tyr Ala Thr Ile Ala Cys Arg Lys
 545 550 555 560

Ala Val Lys Arg Asn Asp Met Leu Ser Ala Glu Phe Ser Lys Phe Leu
 565 570 575

Ile Asn Glu Phe Phe Lys Leu Glu Ile Lys His Cys Pro His Gly Arg
 580 585 590

Lys Ile Tyr Tyr Lys Ile Ser Lys Phe Glu Leu Glu Lys Lys Val Asp
 595 600 605

Arg Ala
 610

<210> 69
 <211> 984
 <212> DNA
 <213> *Borrelia burgdorferi*

<400> 69
 caattttaca acgaaattct taaaaaagat aataaaaatt cttgcatct accaacaatg 60
 agtaaatatc ttgatataat agaaaacaca aaaaccataa taaagctatc ttttaaaaaat 120
 catcccaaat atataattta ttataaaatt aattaccccc ttaaagtgtt ttgttcaaca 180
 atacaagact actatcaaac aatagcaaac aaactaaaac tacggctata actaaactat 240
 cctactacta tttaatcgta aaaaaatatt tctttgcaaa ttaatcaatt tagaaatata 300
 aatgtaaaga catatctttt tatttgataa ataataaaaa ttactggggc actatttgga 360
 aaaattttta aaagaaatat taagtatgaa tagcaaaaat aggctatctt cacacttaat 420
 aattcttatt tacacgctaa acaacattga cctaaattca aaaaatattg ggtacaaaga 480
 gtttgaagag ttaaataaag cacatgaagc tgctttaagt agtagagaat cttagctagt 540
 gtagcttcaa agaagacatg acacttactt ataaataagg aagcttttgg attttaacaa 600
 aaatagtctg gcttttttgc acatataaaa caactccatt atttctaaga taaatatttt 660
 aagctccctg gtaaagtaat tcatttatcc tagatttact cttccacttc tatacgtccc 720
 gtcctgctta atcattaatt tttaaaatta aatgtttctt tctagttacg cactatattg 780
 ttactataac aaaaattgaa tcttaaaaaat taacatatta ctttaaaaaa gtatacttat 840
 aggagatgct tataaagctt aacaaactta tttttaccaa tatatatata tctaatatct 900
 cttatactta gttgctcaat atctaaagat ttaagtata agctctcttc actaaaatct 960
 aatgattttt ttaattcaga cact 984

<210> 70
 <211> 76
 <212> PRT
 <213> *Borrelia burgdorferi*

<400> 70
 Gln Phe Tyr Asn Glu Ile Leu Lys Lys Asp Asn Lys Asn Ser Cys Asp
 1 5 10 15
 Leu Pro Thr Met Ser Lys Tyr Leu Asp Ile Leu Glu Asn Thr Lys Thr
 20 25 30

Ile Ile Lys Leu Ser Phe Lys Asn His Pro Lys Tyr Ile Ile Tyr Tyr

35 40 45
 Lys Ile Asn Tyr Pro Leu Lys Val Phe Cys Ser Thr Ile Gln Asp Tyr
 50 55 60

Tyr Gln Thr Ile Ala Asn Lys Leu Lys Leu Arg Leu
 65 70 75

<210> 71
 <211> 300
 <212> DNA
 <213> *Borrelia burgdorferi*

<400> 71
 atgcctgctt tatgtggcaa tacattatta aatctagaat tgaataatta ttctcaaaaa 60
 aaactattaa aattttacaa cgaaattctt aaaaaagata ataaaaattc ttgcgatcta 120
 ccaacaatga gtaaataatct tgatatatta gaaaacacaa aaaccataat aaagctatct 180
 tttaaaaatc atcccaaata tataatttat tataaaatta attaccccct taaagtgttt 240
 tgttcaacaa tacaagacta ctatcaaaca atagcaaaca aactaaaact acggctataa 300

<210> 72
 <211> 99
 <212> PRT
 <213> *Borrelia burgdorferi*

<400> 72
 Met Pro Ala Leu Cys Gly Asn Thr Leu Leu Asn Leu Glu Leu Asn Asn
 1 5 10 15

Tyr Ser Gln Lys Lys Leu Leu Lys Phe Tyr Asn Glu Ile Leu Lys Lys
 20 25 30

Asp Asn Lys Asn Ser Cys Asp Leu Pro Thr Met Ser Lys Tyr Leu Asp
 35 40 45

Ile Leu Glu Asn Thr Lys Thr Ile Ile Lys Leu Ser Phe Lys Asn His
 50 55 60

Pro Lys Tyr Ile Ile Tyr Tyr Lys Ile Asn Tyr Pro Leu Lys Val Phe
 65 70 75 80

Cys Ser Thr Ile Gln Asp Tyr Tyr Gln Thr Ile Ala Asn Lys Leu Lys
 85 90 95

Leu Arg Leu

<210> 73
 <211> 965
 <212> DNA
 <213> *Borrelia burgdorferi*

<400> 73
 cttctacaca ataaagccca taagtataact ttagaaagtc aatcccaacc cgaatatatt 60

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agtaaagtta acttttacat ttatccaata tctaatatgc aaacagttgg gcttattaat 120
ttaggcacaa aatatagcaa ccatgcatac agtgcatac tagcatttaa tgctagtgtgta 180
aaagcaattg aaatttttaa ggaggaatac aaaattgccg caagatacaa ttagtgtaag 240
tttgcttgac tctagaattc aagctagtag gcccaattat tataatccac ttttggttta 300
caaaacagcc aaaattaaag ttaataaaga tgctgctaac tataaaatat tgaatttaac 360
cgtaataaac tatgaaaaac aaattgaaac tttagaaaaa gataatggga atggacaaga 420
tcagtttgga aaagaaaaaa cactgcttaa aaccgcaatg tcgaattttt tcaattcaag 480
tgaagaatca ttaaaatcag ccgatctttt tatttataag gataaaccgg aagagttaaa 540
aaaatatctt aaagtacata gacacacttt tgttgacttt attaatctg agggtgataa 600
ttccgatgat ggacttaaga tttataaaga tgattatgat aagtttaaaa caccttcaat 660
tttttttgta ttctcaacta aagaacaaga aataaaagaa ctattttaaag ataaaggcaa 720
tactgaaaaa gaaagaaata ttgctgttta cagcaataat aaagacaatt tacacctcaa 780
atttataagt caatatttac atcaagctag tatttttcat gctgtaaatc cttatggcat 840
gccgctggct gctacaccac ttgttgatga tactgttaatt ggaaagttga gaactgcaa 900
aatcaacttt tattcacttc ttaatgaaac tgggcttgat ggtgtaccgg catttaaaga 960
aggtg 965

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<210> 74

<211> 77

<212> PRT

<213> *Borrelia burgdorferi*

<400> 74

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Leu Leu His Asn Lys Ala His Lys Tyr Thr Leu Glu Ser Gln Ser Gln
  1              5              10              15

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Pro Glu Tyr Ile Ser Lys Val Asn Phe Tyr Ile Tyr Pro Ile Ser Asn
          20              25              30

```

```

Met Gln Thr Val Gly Leu Ile Asn Leu Gly Thr Lys Tyr Ser Asn His
          35              40              45

```

```

Ala Tyr Ser Ala Ser Ile Ala Phe Asn Ala Ser Val Lys Ala Ile Glu
          50              55              60

```

```

Ile Leu Lys Glu Glu Tyr Lys Ile Ala Ala Arg Tyr Asn
          65              70              75

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<210> 75

<211> 570

<212> DNA

<213> *Borrelia burgdorferi*

<400> 75

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gcgatgcaa ctgaaaataa ttttgagtgc gatatcataa atacttaca tccccgtac 120
ctttcaaaaa tcacagctgc tagctcaaata ataatagcat tgaaatttga tggtagagaa 180
aatctatttg atcataattc tagagccggg gcattttatg aaaatgcttt ggaattcagt 240
ttaaattttc aaatatatat tattgctata gtgttaaacy ctcaagattt tgacgctaata 300
tcacgtatgt taatgcttta tggtagcttt agcaattttc tacacaataa agcccataag 360
tatacttttag aaagtcaatc ccaacccgaa tatattagta aagttaactt ttacatttat 420
ccaatatcta atatgcaaac agttgggctt attaatttag gcacaaaata tagcaaccat 480
gcatacagtg catctatagc atttaatgct agtgtaaaag caattgaaat tttaaaggag 540
gaatacaaaa ttgccgcaag atacaattag 570

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<210> 76
 <211> 189
 <212> PRT
 <213> *Borrelia burgdorferi*

<400> 76
 Met Ile Phe Thr Leu Asp Met Val Leu Asn His Leu Thr Gln Ile Phe
 1 5 10 15
 Lys Gly Phe Lys Ala Tyr Ala Thr Glu Asn Asn Phe Glu Cys Asp Ile
 20 25 30
 Ile Asn Thr Tyr Asn His Pro Tyr Leu Ser Lys Ile Thr Ala Ala Ser
 35 40 45
 Ser Asn Ile Ile Ala Leu Lys Phe Asp Gly Thr Glu Asn Leu Phe Asp
 50 55 60
 His Asn Ser Arg Ala Gly Ala Phe Tyr Glu Asn Ala Leu Glu Phe Ser
 65 70 75 80
 Leu Asn Phe Gln Ile Tyr Ile Ile Ala Ile Val Leu Asn Ala Gln Asp
 85 90 95
 Phe Asp Ala Asn Ser Arg Met Leu Met Leu Tyr Gly Met Leu Ser Asn
 100 105 110
 Phe Leu His Asn Lys Ala His Lys Tyr Thr Leu Glu Ser Gln Ser Gln
 115 120 125
 Pro Glu Tyr Ile Ser Lys Val Asn Phe Tyr Ile Tyr Pro Ile Ser Asn
 130 135 140
 Met Gln Thr Val Gly Leu Ile Asn Leu Gly Thr Lys Tyr Ser Asn His
 145 150 155 160
 Ala Tyr Ser Ala Ser Ile Ala Phe Asn Ala Ser Val Lys Ala Ile Glu
 165 170 175
 Ile Leu Lys Glu Glu Tyr Lys Ile Ala Ala Arg Tyr Asn
 180 185

<210> 77
 <211> 403
 <212> DNA
 <213> *Borrelia burgdorferi*

<400> 77
 catgattttt ataaaagtaa tgctaaatth acaggattta tgtagataa attatttagt 60
 gatggaaaag aaataattaa aaaacttatg aaagaatata aagaattaaa aggataatat 120
 ggaaatttta tgaatagttt gacttacaga acatacaata tagaaagtat aaaaaatgaa 180
 tttttaaaga taggatttag tgaagaagca atagattttg tttttctgca taatgataat 240
 tacaactttg aattttttaa agaaaaattg attaattgtg aaaagaattt aaaaaggat 300
 atatctaatt tagacattaa gattgatact gtagaaaaga atttaaacac taaaatagac 360
 aatgttgaaa agaattttaa tctaaaaata gataatttag act 403

<210> 78
 <211> 38
 <212> PRT
 <213> *Borrelia burgdorferi*

<400> 78
 His Asp Phe Tyr Lys Ser Asn Ala Lys Phe Thr Gly Phe Met Leu Asp
 1 5 10 15
 Lys Leu Phe Ser Asp Gly Lys Glu Ile Ile Lys Lys Leu Met Lys Glu
 20 25 30
 Tyr Lys Glu Leu Lys Gly
 35

<210> 79
 <211> 543
 <212> DNA
 <213> *Borrelia burgdorferi*

<400> 79
 ttggatatta aggttaataa aagagattta agtgataatg aaaattatat tattactgat 60
 agtgtattaa atcattataa ttcttttaaaa gaaaagttaa aaattaattc taaaaaggaa 120
 atctattgta agttagaaac tttaaaaaatt ttaaaagaaa ttaaagacaa tcattattat 180
 aggtttgatg gttataaaaag ttttgaagct ttttctaaag attatagact tgcaagagca 240
 caggtctata attactttaa aattgctaatt gcaatagaag atgggattat acaagaagaa 300
 tttctaataa aaaatgggat actggaaacg ttaattgtat taagaaataa agagagcaaa 360
 acaataaaaa aatcaaaaaca aaacccgata aagcccttaa gatttcagct taaaagacaa 420
 gaaagctatg atttttataa aagtaatgct aaatttacag gatttatggt agataaatta 480
 tttagtgatg gaaaagaaat aattaaaaaa cttatgaaag aatataaaga attaaaagga 540
 taa 543

<210> 80
 <211> 186
 <212> PRT
 <213> *Borrelia burgdorferi*

<400> 80
 Met Glu Ile Glu Leu Asn Glu Arg Val Ile Ser Arg Ala Thr Asp Pro
 1 5 10 15
 Asp Gly Glu Lys Lys Leu Ile Thr Lys Glu Glu Ile Phe Ala His Tyr
 20 25 30
 Asn Asp Leu Lys Asn Arg Leu Lys Thr Asn Ile Lys Lys Lys Ile Phe
 35 40 45
 Tyr Lys Val Glu Ser Ile Arg Ile Leu Lys Glu Ile Lys Asp Asn Glu
 50 55 60
 Tyr Tyr Lys Leu Asp Gly Tyr Lys Ser Phe Asp Ala Phe Ile Lys Asp
 65 70 75 80

Tyr Gln Leu Ala Arg Thr Gln Val Tyr Ile Tyr Leu Lys Leu Ala Lys
 85 90 95
 Ala Leu Gln Ala Gly Ile Leu Asn Glu Asp Tyr Ile Ile Glu Asn Gly
 100 105 110
 Ile Tyr Asn Ser Leu Asp Lys Ile Glu Ser Gln Glu Thr Pro Ile Val
 115 120 125
 Lys Lys Ser Lys Gln Asn Pro Ile Lys Pro Leu Arg Phe Gln Leu Lys
 130 135 140
 Lys Gln Glu Ser Tyr Asp Phe Tyr Lys Ser Asn Ala Lys Phe Thr Gly
 145 150 155 160
 Phe Met Leu Asp Lys Leu Phe Ser Asp Gly Lys Glu Ile Ile Lys Lys
 165 170 175
 Leu Met Lys Glu Tyr Lys Glu Leu Lys Gly
 180 185

<210> 81
 <211> 1168
 <212> DNA
 <213> *Borrelia burgdorferi*

<400> 81
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 gcattttacaa atattttcaga agcactgatg gcagaaaaat tagaagaaat tttttcagga 120
 ttccaaataa tcgacaaaat attcaaattc aaagaaataa taataataat atcaaataaa 180
 gacaaactaa aaaaagaatt cgaaaaattg agtattttta aaaacagaaa aataaaaaatt 240
 aaatcttttag aaaatgcata tccttatata aatcacgaaa tgataatgca ctttttatatac 300
 aataataaaa atacaaaaga tgatataaat cccacaaca atatttttatt agcaaattatt 360
 gaagatctat acaatgcaaa tcttgtcata aaaaataaca acccttataa agaaaaattt 420
 gtagctataa atggaaataa aaaaataaaa agtagaatac tgaaggtaaa aattggaacc 480
 tctttcagcc agctaataaa tgagaaaatt gacacaaaaa aatatgaaat tttttttaa 540
 aaccagcca ataaaataaa aatcgatata ttaaacatac cgataacaag agatatttat 600
 agtctcacca tattaagaa aaagtcaata tacgacaaaa ttaaagcatt gtttatatca 660
 agctttgcac cattgcaaat ggaaaatatt attttttcat tcttaaagaa agaaaaaata 720
 aataatagcg gcaaatataa aatattttaat tatacagaca aagaagtaga agaagaaata 780
 cataaggttc aaaaagaaat taaaagcaaa attctaaatg aaagtctaac aaatgaagca 840
 atatacactg aaaacaattt aaaagacata tactttgcta tcatactatc actatcacct 900
 agcctgatat tttctttcct aaataacaca aaattcatga cagacacctt gctgttaata 960
 tttattagtg tggcaatcta tatacctata atgctaaaaa ttaattacaa atgtttgtct 1020
 ttttttggtt acgccgcctt aatgataagc attatattgc ccttggtatt agaaattaca 1080
 ctaaaaataa tttccttatt atttactttt ttggtattct tttacttttt cagactatca 1140
 gcatttttgg caaacctat attaatatt 1168

<210> 82
 <211> 389
 <212> PRT
 <213> *Borrelia burgdorferi*

<400> 82
 Gln Phe Ile Asn Lys Cys Lys Lys Ile Asp Lys Met Ile Leu Leu Thr

1	5	10	15
Asn Gly Lys Asp Ala Phe Thr Asn Ile Ser Glu Ala Leu Met Ala Glu	20	25	30
Lys Leu Glu Glu Ile Phe Ser Gly Phe Gln Ile Ile Asp Lys Ile Phe	35	40	45
Lys Phe Lys Glu Ile Ile Ile Ile Ile Ser Asn Lys Asp Lys Leu Lys	50	55	60
Lys Glu Phe Glu Lys Leu Ser Ile Phe Lys Asn Arg Lys Ile Lys Ile	65	70	75
Lys Ser Leu Glu Asn Ala Tyr Pro Tyr Thr Asn His Glu Met Ile Met	85	90	95
His Phe Leu Tyr Asn Asn Lys Asn Thr Lys Asp Asp Ile Asn Pro His	100	105	110
Asn Asn Ile Leu Leu Ala Asn Ile Glu Asp Leu Tyr Asn Ala Asn Leu	115	120	125
Val Ile Lys Asn Asn Asn Pro Tyr Lys Glu Lys Phe Val Ala Ile Asn	130	135	140
Gly Asn Lys Lys Ile Lys Ser Arg Ile Leu Lys Val Lys Ile Gly Thr	145	150	155
Ser Phe Ser Gln Leu Ile Asn Glu Lys Ile Asp Thr Lys Lys Tyr Glu	165	170	175
Ile Phe Leu Asn Asn Pro Ala Asn Lys Ile Lys Ile Asp Thr Leu Asn	180	185	190
Ile Pro Ile Thr Arg Asp Ile Tyr Ser Leu Thr Ile Leu Lys Lys Lys	195	200	205
Ser Ile Tyr Asp Lys Ile Lys Ala Leu Phe Ile Ser Ser Phe Ala Pro	210	215	220
Leu Gln Met Glu Asn Ile Ile Phe Ser Phe Leu Lys Lys Glu Lys Ile	225	230	235
Asn Asn Ser Gly Lys Leu Lys Ile Phe Asn Tyr Thr Asp Lys Glu Val	245	250	255
Glu Glu Glu Ile His Lys Val Gln Lys Glu Ile Lys Ser Lys Ile Leu	260	265	270
Asn Glu Ser Leu Thr Asn Glu Ala Ile Tyr Thr Glu Asn Asn Leu Lys	275	280	285
Asp Ile Tyr Phe Ala Ile Ile Leu Ser Leu Ser Pro Ser Leu Ile Phe	290	295	300
Ser Phe Leu Asn Asn Thr Lys Phe Met Thr Asp Thr Leu Leu Leu Ile			

305 310 315 320
 Phe Ile Ser Val Ala Ile Tyr Ile Pro Ile Met Leu Lys Ile Asn Tyr
 325 330 335
 Lys Cys Leu Ser Phe Phe Val Tyr Ala Ala Leu Met Ile Ser Ile Ile
 340 345 350
 Leu Pro Leu Asp Leu Glu Ile Thr Leu Lys Ile Ile Ser Leu Leu Phe
 355 360 365
 Thr Phe Leu Val Phe Phe Tyr Phe Phe Arg Leu Ser Ala Phe Leu Ala
 370 375 380
 Asn Pro Ile Leu Ile
 385

<210> 83
 <211> 2322
 <212> DNA
 <213> *Borrelia burgdorferi*

<400> 83
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 attaacgaga ttcaaatacc tgaatatgcc ctaatacccc ttgaaacaga aaattcaaaa 120
 tccataatat acataattga aaaacaaaaa atagaagaaa atcaaatttt atccaaaaac 180
 tcaaacatag agctatacac atattctcca atatctggaa tagtagaaaa aatatacaca 240
 gccaattttc cagatggaaa aaatttataaa tcagcattaa tcaaatttca aggaaaaata 300
 aaaactgaaa aaacaccaat tgaagaagga gcctcaagag aaaaaacctt ggaaaaatta 360
 attcaactgg gaattccttg gtttaacgaa aattctttat ttcaattcat aaacaaatgt 420
 aaaaaaatag acaaaatgat tttattaaca aacggaaaag atgcatttac aaatatttca 480
 gaagcactga tggcagaaaa attagaagaa attttttcag gattccaaat aatcgacaaa 540
 atattcaaat tcaaagaaat aataataata atatcaaata aagacaaact aaaaaagaa 600
 ttcgaaaaat tgagtatttt taaaaacaga aaaataaaaa ttaaattctt agaaaatgca 660
 tatccttata caaatcacga aatgataatg cactttttat acaataataa aaatacaaaa 720
 gatgatataa atccccacaa caatatttta ttagcaaata ttgaagatct atacaatgca 780
 aatcttgtca taaaaataa caacccttat aaagaaaaat ttgtagctat aaatggaaat 840
 aaaaaataa aaagtagaat actgaaggta aaaattggaa cctctttcag ccagctaata 900
 aatgagaaaa ttgacacaaa aaaatatgaa atttttttta acaaccagc caataaaaata 960
 aaaatcgata cattaaacat accgataaca agagatatat atagtctcac catattaaag 1020
 aaaaagtcaa tatacgacaa aattaaagca ttgtttatat caagctttgc accattgcaa 1080
 atggaaaata ttattttttc attcttaaag aaagaaaaaa taaataatag cggcaaatta 1140
 aaaatattta attatacaga caaagaagta gaagaagaaa tacataaggt tcaaaaagaa 1200
 attaaaagca aaattctaaa tgaaagtcta acaaatgaag caatatacac tgaaaacaat 1260
 ttaaaaagca tatactttgc tatcactata tcactatcac ctagcctgat attttctttc 1320
 ctaaataaca caaaattcat gacagacacc ttgctgttaa tatttattag tgtggcaatc 1380
 tatataccta taatgctaaa aattaattac aaatgtttgt ctttttttgt ttacgccgcc 1440
 ttaatgataa gcattatatt gcccttggat ttagaaatta cactaaaaat aatttcctta 1500
 ttattttact ttttggtatt cttttacttt ttcagactat cagcattttt ggcaaaccct 1560
 atattaattt cttttatggt ttttggtatta aattttccgg taagttttaa gcaagcctat 1620
 caagaggaac ttaaaaattc aaattcaata attccaacct ggaatgaaat aattgaaaca 1680
 aatccaaaca taaaaaattt aaaaagttta aataccttta caagatatga aagtaaaaaa 1740
 atagatgcaa ttgaaaactt tgtaaatcaa aacatttttt ccgcttttaa tataattgtc 1800
 acaagatttc atattgaaag tcttttggga gttaataatg aaaaaaaaa atctcctatc 1860
 ttgctttatt ttggcctctt attaatagtt ggcaaatata taatcaacaa attaatacca 1920
 ctctcatttt atataagctt aatggcaatc tcgtacatag cacataatat aggaatgcta 1980

aaccacatca gctccgacat gttaacacta cttattttctc caatcccaat gctgttaata 2040
tttacaatgg caacagaatt gcaaataaca cctcacttta aatttgagca aatactctac 2100
ggatcaatat tggcatttat atactttttg acattaagct acattccttt tgaaacttta 2160
tcagtcataa tatctatttt catcttacia acaagctcaa acttaataaa aaaatatagc 2220
ttaaccttca aaattaaaaa aataatgcat gttttgaaaa caaataaaga aaaagcactc 2280
aaaacacctc ttgagaatga aaaggatata ataaaattat ga 2322

<210> 84

<211> 773

<212> PRT

<213> *Borrelia burgdorferi*

<400> 84

Met Leu Asp Leu Glu Lys Val Lys Thr Ile Phe Lys Lys Tyr Asn Lys
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Tyr Glu Ile Asn Ile Asn Glu Ile Gln Ile Pro Glu Tyr Ala Leu Ile
20 25 30

Pro Leu Glu Thr Glu Asn Ser Lys Ser Ile Ile Tyr Ile Ile Glu Lys
35 40 45

Gln Lys Ile Glu Glu Asn Gln Ile Leu Ser Lys Asn Ser Asn Ile Glu
50 55 60

Leu Tyr Thr Tyr Ser Pro Ile Ser Gly Ile Val Glu Lys Ile Tyr Thr
65 70 75 80

Ala Asn Phe Pro Asp Gly Lys Asn Leu Lys Ser Ala Leu Ile Lys Phe
85 90 95

Gln Gly Lys Ile Lys Thr Glu Lys Thr Pro Ile Glu Glu Gly Ala Ser
100 105 110

Arg Glu Lys Thr Leu Glu Lys Leu Ile Gln Leu Gly Ile Pro Trp Phe
115 120 125

Asn Glu Asn Ser Leu Phe Gln Phe Ile Asn Lys Cys Lys Lys Ile Asp
130 135 140

Lys Met Ile Leu Leu Thr Asn Gly Lys Asp Ala Phe Thr Asn Ile Ser
145 150 155 160

Glu Ala Leu Met Ala Glu Lys Leu Glu Glu Ile Phe Ser Gly Phe Gln
165 170 175

Ile Ile Asp Lys Ile Phe Lys Phe Lys Glu Ile Ile Ile Ile Ile Ser
180 185 190

Asn Lys Asp Lys Leu Lys Lys Glu Phe Glu Lys Leu Ser Ile Phe Lys
195 200 205

Asn Arg Lys Ile Lys Ile Lys Ser Leu Glu Asn Ala Tyr Pro Tyr Thr
210 215 220

Asn His Glu Met Ile Met His Phe Leu Tyr Asn Asn Lys Asn Thr Lys

25348199.1

225		230		235		240									
Asp	Asp	Ile	Asn	Pro	His	Asn	Asn	Ile	Leu	Leu	Ala	Asn	Ile	Glu	Asp
				245					250					255	
Leu	Tyr	Asn	Ala	Asn	Leu	Val	Ile	Lys	Asn	Asn	Asn	Pro	Tyr	Lys	Glu
			260					265					270		
Lys	Phe	Val	Ala	Ile	Asn	Gly	Asn	Lys	Lys	Ile	Lys	Ser	Arg	Ile	Leu
		275					280					285			
Lys	Val	Lys	Ile	Gly	Thr	Ser	Phe	Ser	Gln	Leu	Ile	Asn	Glu	Lys	Ile
	290					295					300				
Asp	Thr	Lys	Lys	Tyr	Glu	Ile	Phe	Leu	Asn	Asn	Pro	Ala	Asn	Lys	Ile
305					310					315					320
Lys	Ile	Asp	Thr	Leu	Asn	Ile	Pro	Ile	Thr	Arg	Asp	Ile	Tyr	Ser	Leu
				325					330					335	
Thr	Ile	Leu	Lys	Lys	Lys	Ser	Ile	Tyr	Asp	Lys	Ile	Lys	Ala	Leu	Phe
			340					345					350		
Ile	Ser	Ser	Phe	Ala	Pro	Leu	Gln	Met	Glu	Asn	Ile	Ile	Phe	Ser	Phe
		355					360					365			
Leu	Lys	Lys	Glu	Lys	Ile	Asn	Asn	Ser	Gly	Lys	Leu	Lys	Ile	Phe	Asn
	370					375					380				
Tyr	Thr	Asp	Lys	Glu	Val	Glu	Glu	Glu	Ile	His	Lys	Val	Gln	Lys	Glu
385					390					395					400
Ile	Lys	Ser	Lys	Ile	Leu	Asn	Glu	Ser	Leu	Thr	Asn	Glu	Ala	Ile	Tyr
				405					410					415	
Thr	Glu	Asn	Asn	Leu	Lys	Asp	Ile	Tyr	Phe	Ala	Ile	Ile	Leu	Ser	Leu
			420					425					430		
Ser	Pro	Ser	Leu	Ile	Phe	Ser	Phe	Leu	Asn	Asn	Thr	Lys	Phe	Met	Thr
		435					440					445			
Asp	Thr	Leu	Leu	Leu	Ile	Phe	Ile	Ser	Val	Ala	Ile	Tyr	Ile	Pro	Ile
	450					455					460				
Met	Leu	Lys	Ile	Asn	Tyr	Lys	Cys	Leu	Ser	Phe	Phe	Val	Tyr	Ala	Ala
465				470						475					480
Leu	Met	Ile	Ser	Ile	Ile	Leu	Pro	Leu	Asp	Leu	Glu	Ile	Thr	Leu	Lys
				485					490					495	
Ile	Ile	Ser	Leu	Leu	Phe	Thr	Phe	Leu	Val	Phe	Phe	Tyr	Phe	Phe	Arg
			500					505					510		
Leu	Ser	Ala	Phe	Leu	Ala	Asn	Pro	Ile	Leu	Ile	Ser	Phe	Met	Phe	Leu
		515					520					525			
Val	Leu	Asn	Phe	Pro	Val	Ser	Phe	Lys	Gln	Ala	Tyr	Gln	Glu	Glu	Leu

530		535		540
Lys Asn Ser Asn Ser	Ile Ile Pro Thr Trp	Asn Glu Ile Ile Glu Thr		
545	550	555	560	
Asn Pro Asn Ile Lys	Asn Leu Lys Ser	Leu Asn Thr Phe Thr Arg Tyr		
	565	570	575	
Glu Ser Lys Lys Ile	Asp Ala Ile Glu Asn Phe Val	Asn Gln Asn Ile		
	580	585	590	
Phe Ser Ala Phe Asn	Ile Ile Val Thr Arg Phe His	Ile Glu Ser Leu		
	595	600	605	
Leu Gly Val Asn Asn	Glu Lys Lys Ile Ser Pro	Ile Leu Leu Tyr Phe		
	610	615	620	
Gly Leu Leu Leu Ile	Val Gly Lys Tyr Ile Ile	Asn Lys Leu Ile Pro		
	625	630	635	640
Leu Ser Phe Tyr Ile	Ser Leu Met Ala Ile Ser Tyr Ile	Ala His Asn		
	645	650	655	
Ile Gly Met Leu Asn	His Ile Ser Ser Asp Met	Leu Thr Leu Leu Ile		
	660	665	670	
Ser Pro Ile Pro Met	Leu Leu Ile Phe Thr Met	Ala Thr Glu Leu Gln		
	675	680	685	
Ile Thr Pro His Phe	Lys Phe Glu Gln Ile Leu Tyr Gly	Ser Ile Leu		
	690	695	700	
Ala Phe Ile Tyr Phe	Leu Thr Leu Ser Tyr Ile Pro	Phe Glu Thr Leu		
	705	710	715	720
Ser Val Ile Ile Ser	Ile Phe Ile Leu Gln Thr Ser Ser	Asn Leu Ile		
	725	730	735	
Lys Lys Tyr Ser Leu	Thr Phe Lys Ile Lys Lys Ile	Met His Val Leu		
	740	745	750	
Lys Thr Asn Lys Glu	Lys Ala Leu Lys Thr Pro	Leu Glu Asn Glu Lys		
	755	760	765	
Asp Ile Ile Lys Leu				
770				

<210> 85
 <211> 704
 <212> DNA
 <213> *Borrelia burgdorferi*

<400> 85
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 tatccacaac caagttgggt ggaacatgat cctacagaaa tatggggctc acaacttgga 180

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gttataacag aagctatggc aaatgcaaga attttgccca atgaaattga cgctattgga 240
ataactaatc aaagagaaac tacgggtata tgggaaaaaa atacaggaaa gcccatctac 300
aatgcaatag tatggcaaga cagaagaact gcaaaaattt gtgaccaatt aaaaaaagaa 360
ggaaaagata aaattathtt ggaaaaaaca ggcttgggtgc tagattctta ttttagtgga 420
acaaaaataa tgtggatatt ggataatgta gaaggtgccca gacaaagagc cgaaaatggc 480
gaattatgct ttggaacaat agatacatgg atattgtgga acctgactca aaaaaaagaa 540
catgcaaccg attactctaa tgcttcaaga acattattat taaacattaa aacattagag 600
tgggatgatg aacttttaag catattaaat gttccaaggg caattttgcc tgaacttaaa 660
gaaagttcta caatatacgg caaaacagac aaagcactat ttgg 704

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<210> 86
 <211> 234
 <212> PRT
 <213> *Borrelia burgdorferi*

<400> 86
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 1 5 10 15
 Ser Ser Arg Ala Met Val Phe Asp Lys Asn Ala Asn Ile Lys Gly Phe
 20 25 30
 Ala Gln Lys Glu Phe Thr Gln Ile Tyr Pro Gln Pro Ser Trp Val Glu
 35 40 45
 His Asp Pro Thr Glu Ile Trp Gly Ser Gln Leu Gly Val Ile Thr Glu
 50 55 60
 Ala Met Ala Asn Ala Arg Ile Leu Pro Asn Glu Ile Asp Ala Ile Gly
 65 70 75 80
 Ile Thr Asn Gln Arg Glu Thr Thr Val Ile Trp Glu Lys Asn Thr Gly
 85 90 95
 Lys Pro Ile Tyr Asn Ala Ile Val Trp Gln Asp Arg Arg Thr Ala Lys
 100 105 110
 Ile Cys Asp Gln Leu Lys Lys Glu Gly Lys Asp Lys Ile Ile Leu Glu
 115 120 125
 Lys Thr Gly Leu Val Leu Asp Ser Tyr Phe Ser Gly Thr Lys Ile Met
 130 135 140
 Trp Ile Leu Asp Asn Val Glu Gly Ala Arg Gln Arg Ala Glu Asn Gly
 145 150 155 160
 Glu Leu Cys Phe Gly Thr Ile Asp Thr Trp Ile Leu Trp Asn Leu Thr
 165 170 175
 Gln Lys Lys Glu His Ala Thr Asp Tyr Ser Asn Ala Ser Arg Thr Leu
 180 185 190
 Leu Leu Asn Ile Lys Thr Leu Glu Trp Asp Asp Glu Leu Leu Ser Ile
 195 200 205
 Leu Asn Val Pro Arg Ala Ile Leu Pro Glu Leu Lys Glu Ser Ser Thr

210

215

220

Ile Tyr Gly Lys Thr Asp Lys Ala Leu Phe
225 230

<210> 87

<211> 1506

<212> DNA

<213> *Borrelia burgdorferi*

<400> 87

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agttgggtgg aacatgatcc tacagaaata tggggctcac aacttgaggt tataacagaa 180
gctatggcaa atgcaagaat tttgccaat gaaattgacg ctattggaat aactaatcaa 240
agagaaacta cggttatatg ggaaaaaaat acaggaaagc ccatctacaa tgcaatagta 300
tggcaagaca gaagaactgc aaaaatttgt gaccaattaa aaaaagaagg aaaagataaa 360
attattttgg aaaaaacagg cttggtgcta gattcttatt ttagtggaac aaaaataatg 420
tggatattgg ataatgtaga aggtgccaga caaagagccg aaaatggcga attatgcttt 480
ggaacaatag atacatggat attgtggaac ctgactcaaa aaaaagaaca tgcaaccgat 540
tactctaattg cttcaagaac attattatta aacattaaaa cattagagtg ggatgatgaa 600
cttttaagca tattaaatgt tccaagggca attttgcttg aacttaaga aagttctaca 660
atatacggca aaacagacaa agcactattt ggagcagaaa ttcctattgc aggaattgct 720
ggggatcaat ttgcagcaac atttgagcaa gcctgcctta aaaaggggat ggccaaaaac 780
acttatggaa ctggctgctt cttaacggtt aatataggaa aagaaccaat cattagccac 840
gacaagcttt taacttcaat tgcattggga agaaaaaaat ctgtaaccta cgttcttgaa 900
ggaagtgttt ttattggagg agctgtaatc cagtgggtta gagacgggtc tgaatttttc 960
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gctgcttatc ttgcaggact tgcaacgggt tattggcaaa gcgccgaaga aatcgtaagc 1380
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<210> 88

<211> 449

<212> PRT

<213> *Borrelia burgdorferi*

<400> 88

Met Lys Tyr Ile Leu Ser Ile Asp Gln Gly Thr Thr Ser Ser Arg Ala
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Met Val Phe Asp Lys Asn Ala Asn Ile Lys Gly Phe Ala Gln Lys Glu
20 25 30

Phe Thr Gln Ile Tyr Pro Gln Pro Ser Trp Val Glu His Asp Pro Thr
35 40 45

Glu Ile Trp Gly Ser Gln Leu Gly Val Ile Thr Glu Ala Met Ala Asn
50 55 60

25348199.1

Ala	Arg	Ile	Leu	Pro	Asn	Glu	Ile	Asp	Ala	Ile	Gly	Ile	Thr	Asn	Gln	
65					70					75					80	
Arg	Glu	Thr	Thr	Val	Ile	Trp	Glu	Lys	Asn	Thr	Gly	Lys	Pro	Ile	Tyr	
				85					90					95		
Asn	Ala	Ile	Val	Trp	Gln	Asp	Arg	Arg	Thr	Ala	Lys	Ile	Cys	Asp	Gln	
			100					105					110			
Leu	Lys	Lys	Glu	Gly	Lys	Asp	Lys	Ile	Ile	Leu	Glu	Lys	Thr	Gly	Leu	
		115					120					125				
Val	Leu	Asp	Ser	Tyr	Phe	Ser	Gly	Thr	Lys	Ile	Met	Trp	Ile	Leu	Asp	
	130					135					140					
Asn	Val	Glu	Gly	Ala	Arg	Gln	Arg	Ala	Glu	Asn	Gly	Glu	Leu	Cys	Phe	
145					150					155					160	
Gly	Thr	Ile	Asp	Thr	Trp	Ile	Leu	Trp	Asn	Leu	Thr	Gln	Lys	Lys	Glu	
				165					170						175	
His	Ala	Thr	Asp	Tyr	Ser	Asn	Ala	Ser	Arg	Thr	Leu	Leu	Leu	Asn	Ile	
			180					185					190			
Lys	Thr	Leu	Glu	Trp	Asp	Asp	Glu	Leu	Leu	Ser	Ile	Leu	Asn	Val	Pro	
		195					200					205				
Arg	Ala	Ile	Leu	Pro	Glu	Leu	Lys	Glu	Ser	Ser	Thr	Ile	Tyr	Gly	Lys	
	210					215					220					
Thr	Asp	Lys	Ala	Leu	Phe	Gly	Ala	Glu	Ile	Pro	Ile	Ala	Gly	Ile	Ala	
225					230					235					240	
Gly	Asp	Gln	Phe	Ala	Ala	Thr	Phe	Gly	Gln	Ala	Cys	Leu	Lys	Lys	Gly	
			245						250					255		
Met	Ala	Lys	Asn	Thr	Tyr	Gly	Thr	Gly	Cys	Phe	Leu	Thr	Val	Asn	Ile	
			260					265					270			
Gly	Lys	Glu	Pro	Ile	Ile	Ser	His	Asp	Lys	Leu	Leu	Thr	Ser	Ile	Ala	
		275					280					285				
Trp	Gly	Arg	Lys	Lys	Ser	Val	Thr	Tyr	Val	Leu	Glu	Gly	Ser	Val	Phe	
	290					295					300					
Ile	Gly	Gly	Ala	Val	Ile	Gln	Trp	Leu	Arg	Asp	Gly	Leu	Glu	Phe	Phe	
305					310					315					320	
Arg	Lys	Ser	Ser	Asp	Ala	Glu	Ala	Leu	Ala	Ser	Ser	Val	Ser	Asp	Asn	
				325					330					335		
Gly	Gly	Val	Tyr	Phe	Val	Pro	Ala	Phe	Val	Gly	Leu	Gly	Ala	Pro	His	
			340					345					350			
Trp	Asp	Ser	Tyr	Ala	Arg	Gly	Thr	Ile	Ile	Gly	Ile	Thr	Arg	Gly	Ser	
		355					360					365				

Thr Lys Ala His Ile Thr Arg Ala Ala Leu Glu Ser Ile Ala Phe Gln
 370 375 380
 Ser Phe Asp Ile Leu Asn Thr Met Lys Lys Ser Ile Pro Asn Phe Glu
 385 390 395 400
 Ile Gln Glu Leu Arg Val Asp Gly Gly Ala Ser Gln Asn Asn Leu Leu
 405 410 415
 Met Gln Phe Gln Ala Asp Leu Leu Glu Cys Lys Val Val Arg Pro Lys
 420 425 430
 Ile Thr Glu Thr Thr Ala Leu Gly Ala Ala Tyr Leu Ala Gly Leu Ala
 435 440 445

Thr

<210> 89
 <211> 311
 <212> DNA
 <213> *Borrelia burgdorferi*

<400> 89
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 ggaatatctt ttttaaattt ggataattat aatgaaaaaa tgaatgaaaa gattgtatct 120
 aaaattatga gcactacggg gtatatattt tgcgaacttt tagtttattt gagaacatat 180
 actatatttatt ttgttaaaaa agatcttaat gatattatta atttacttat tattaaagga 240
 caatggaagc ttatagagct ttcaagagaa atgtctaacg acatgcatgc tttgattaat 300
 atttatgcaa g 311

<210> 90
 <211> 103
 <212> PRT
 <213> *Borrelia burgdorferi*

<400> 90
 Gln Ile Lys Val Leu Gln Lys Asn Asn Lys Ser Lys Ile Leu Ala Glu
 1 5 10 15
 Gln Leu Phe Pro Gly Ile Ser Phe Leu Asn Leu Asp Asn Tyr Asn Glu
 20 25 30
 Lys Met Asn Glu Lys Ile Val Ser Lys Ile Met Ser Thr Thr Gly Tyr
 35 40 45
 Ile Tyr Cys Glu Leu Leu Val Tyr Leu Arg Thr Tyr Thr Ile Tyr Phe
 50 55 60
 Val Lys Lys Asp Leu Asn Asp Ile Ile Asn Leu Leu Ile Ile Lys Gly
 65 70 75 80
 Gln Trp Lys Leu Ile Glu Leu Ser Arg Glu Met Ser Asn Asp Met His
 85 90 95

Ala Leu Ile Asn Ile Tyr Ala
100

<210> 91
<211> 1569
<212> DNA
<213> *Borrelia burgdorferi*

<400> 91
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agtaattttt ttaatgcttc aaaaattcag gctttacctc aattttctag atttctttat 180
aatttttata aaattttttc tcccttaagg ccatttgcac aaagatataa aaatttcta 240
aaaattgttc attttgttgt tgaaaaatac ttaaatgaaa accaaaagaa gtcttttagat 300
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gatgaaactt atgaagcttt gcataatttt tttgatttag tcttataatca atatcatttg 480
gttcttaaaa attttgacaa cttgcttcca gaagatgatt ttgtgtatag gcctagattc 540
agctctatag gttgtggagt tattatagat gatcttaaaag atttggtaga atgtatttct 600
tgcattaaga atatttctat ttggaaaaaac ctttatgaca ttattttaga aatttatggg 660
aataaagaag attttcctat taagtctaag gtatggatta aggttatattc ttctattttg 720
gatataaata agagtaaaga aattttatat ctaataagat atgtagtggt ggatccagat 780
tatttcccta tttctgttgg gcaaaaaccc aatccaatag caagaatgtt ttttaatgat 840
cttactaagc atgttgccac tgaaattgaa aagattaaag ttttgcaaaa aaataataaa 900
tctaaaatat tagccgagca gcttttccca ggaatatctt ttttaaattt ggataattat 960
aatgaaaaaa tgaatgaaaa gattgtatct aaaattatga gcactacggg gtatatattt 1020
tgcgaaacttt tagtttattt gagaacatat actatttatt ttgttaaaaa agatcctaat 1080
gatattatta atttacttat tattaaagga caatggaagc ttatagagct ttcaagagaa 1140
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aatttggggg aacaaggcgg ttatggcaat agaataaatg cattattgca cagagcttct 1260
ttgggggata aatcttcgga gaaattgttg ttaaatataa tagcagatgt taataaaaaag 1320
gcgtttgcta tatcaagcga atattattcc aaaatatatt ctattgagca gcgtttgcaa 1380
gattgtcttt cagactattc aaaagtctct ttggaaagag agctgattta taattggaaa 1440
gagcttgata tggatcttgc taaaagctat ggaaacaatt taaactttgg aggtatgatg 1500
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aaatcttaa 1569

<210> 92
<211> 522
<212> PRT
<213> *Borrelia burgdorferi*

<400> 92
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20 25 30
Val Lys Val Ser Leu Gly Arg Val Ser Asn Phe Phe Asn Ala Ser Lys
35 40 45
Ile Gln Ala Leu Pro Gln Phe Ser Arg Phe Leu Tyr Asn Phe Tyr Lys
50 55 60

Ile	Phe	Ser	Pro	Leu	Arg	Pro	Phe	Ala	Gln	Arg	Tyr	Lys	Asn	Ser	Asn	
65					70					75					80	
Lys	Ile	Val	His	Phe	Val	Val	Glu	Lys	Tyr	Leu	Asn	Glu	Asn	Gln	Lys	
			85						90					95		
Lys	Ser	Leu	Asp	Tyr	Ile	Tyr	Ser	Phe	Ser	Ala	Ser	Asp	Asn	Ile	Asn	
			100					105					110			
Phe	Ala	Ser	Asp	Leu	Pro	Lys	Asn	Leu	His	Asn	Asn	Leu	Ser	Tyr	Leu	
		115					120					125				
Phe	Lys	Asn	Ile	Thr	Gln	Glu	Gln	Ile	Lys	Leu	Ile	Asp	Glu	Thr	Tyr	
	130					135					140					
Glu	Ala	Leu	His	Asn	Phe	Phe	Asp	Leu	Val	Leu	Tyr	Gln	Tyr	His	Leu	
145					150					155					160	
Val	Leu	Lys	Asn	Phe	Asp	Asn	Leu	Leu	Pro	Glu	Asp	Asp	Phe	Val	Tyr	
				165					170					175		
Arg	Pro	Arg	Phe	Ser	Ser	Ile	Gly	Cys	Gly	Val	Ile	Ile	Asp	Asp	Leu	
			180					185					190			
Lys	Asp	Leu	Leu	Glu	Cys	Ile	Ser	Cys	Ile	Lys	Asn	Ile	Ser	Ile	Trp	
		195					200					205				
Lys	Asn	Leu	Tyr	Asp	Ile	Ile	Leu	Glu	Ile	Tyr	Gly	Asn	Lys	Glu	Asp	
	210				215						220					
Phe	Pro	Ile	Lys	Ser	Asn	Val	Trp	Ile	Lys	Val	Ile	Ser	Ser	Ile	Leu	
225					230					235					240	
Asp	Ile	Asn	Lys	Ser	Lys	Glu	Ile	Leu	Tyr	Leu	Ile	Arg	Tyr	Val	Ser	
			245						250					255		
Gly	Asp	Pro	Asp	Tyr	Phe	Pro	Ile	Ser	Val	Gly	Gln	Lys	Pro	Asn	Pro	
			260					265					270			
Ile	Ala	Arg	Met	Phe	Phe	Asn	Asp	Leu	Thr	Lys	His	Val	Ala	Thr	Glu	
		275					280					285				
Ile	Glu	Lys	Ile	Lys	Val	Leu	Gln	Lys	Asn	Asn	Lys	Ser	Lys	Ile	Leu	
	290					295					300					
Ala	Glu	Gln	Leu	Phe	Pro	Gly	Ile	Ser	Phe	Leu	Asn	Leu	Asp	Asn	Tyr	
305					310					315					320	
Asn	Glu	Lys	Met	Asn	Glu	Lys	Ile	Val	Ser	Lys	Ile	Met	Ser	Thr	Thr	
			325						330					335		
Gly	Tyr	Ile	Tyr	Cys	Glu	Leu	Leu	Val	Tyr	Leu	Arg	Thr	Tyr	Thr	Ile	
			340					345					350			
Tyr	Phe	Val	Lys	Lys	Asp	Leu	Asn	Asp	Ile	Ile	Asn	Leu	Leu	Ile	Ile	
		355					360					365				

Lys Gly Gln Trp Lys Leu Ile Glu Leu Ser Arg Glu Met Ser Asn Asp
 370 375 380
 Met His Ala Leu Ile Asn Ile Tyr Ala Ser Leu Ile Asp Phe Asp Ser
 385 390 395 400
 Asn Leu Gly Glu Gln Gly Gly Tyr Gly Asn Arg Ile Asn Ala Leu Leu
 405 410 415
 His Arg Ala Ser Leu Gly Asp Lys Ser Ser Glu Lys Leu Leu Leu Asn
 420 425 430
 Ile Ile Ala Asp Val Asn Lys Lys Ala Phe Ala Ile Ser Ser Glu Tyr
 435 440 445
 Tyr Ser Lys Ile Tyr Ser Ile Glu Gln Arg Leu Gln Asp Cys Leu Ser
 450 455 460
 Asp Tyr Ser Lys Val Ser Leu Glu Arg Glu Leu Ile Tyr Asn Trp Lys
 465 470 475 480
 Glu Leu Asp Met Asp Leu Ala Lys Ser Tyr Gly Asn Asn Leu Asn Phe
 485 490 495
 Gly Gly Met Met Lys Asn Ile Leu Gly Ser Leu Ala Leu Phe Leu Lys
 500 505 510
 Leu Met Asp Leu Tyr Leu Glu Lys Lys Ser
 515 520

<210> 93
 <211> 699
 <212> DNA
 <213> *Borrelia burgdorferi*

<400> 93
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 aatgaaaaag tttacagaat tacgcttgat tctcagcttt ttaatgttgc tatgaaaaaa 180
 ataattgaaa aatatcctaa aataaaaagt gcaagttttg catttaattc gttaattaac 240
 taaaaaaata ttttaaaagc tagcagttta aaaccactag ctttttaaat taattataaa 300
 tttcagactt ggatttgcta tatagtgtct ttaagtttat taagtgtggt tttggaatct 360
 gcttgattaa aaattccatc aaatccgcta gcaagtatgc ttttgtaagt atttagctct 420
 tctggatctt tttctttttt atctttattt tctttaattt tcgcaagcag atcttttatt 480
 tcatcttctt ttagctctga tagaaatttt tgtacagatt cttctatttt gctttcgtct 540
 ccaccgctat ttttaaaatg taagccaata tttggatcta ctagtttttc ttttaataag 600
 tttgttaaaa atgttagtgt ttctttttcc gtgttgttta agtttaaatct gcttactaat 660
 ttttctaaag gtgttgatc tggtaccacg cgtatcgat 699

<210> 94
 <211> 80
 <212> PRT
 <213> *Borrelia burgdorferi*

<400> 94

His Pro Phe Gly Ser Ser Asp Ala Lys Lys Val Ile Glu Ala Phe Ala
1 5 10 15
Ser Leu Tyr Asn Asn Gly Thr Trp Ser Asp Met Ile Ala Glu Ile Thr
20 25 30
Ile Lys Ser Lys Gln Tyr Pro Lys Asn Glu Lys Val Tyr Arg Ile Thr
35 40 45
Leu Asp Ser Gln Leu Phe Asn Val Ala Met Lys Lys Ile Ile Glu Lys
50 55 60
Tyr Pro Lys Ile Lys Ser Ala Ser Phe Ala Phe Asn Ser Leu Ile Asn
65 70 75 80

<210> 95

<211> 849

<212> DNA

<213> *Borrelia burgdorferi*

<400> 95

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ggtcaagaaa atagagcctt gggggcgatg aattttgggc ttttttctgg agattctggg 180
gtagtttatg atttgcaaaa ttatgaaact ttaaaagctc ttgaaaataa aaataaattt 240
attgattact ctaaaataga gtttttagaa ggaacaaaat caataaatgc ttttatttgg 300
gcagtttctg ttcgttggat aaaaattaaa gccagagatt tgtttgggga gtgtggagat 360
tttattaaag agcttaaggg cattaagtat tcttatcttg tttctcctgt tgatggaagc 420
tatatttctt atgccatgcc tataatagtt tttgaaacta ctagagagag tgatccgctt 480
tattctgttt ctgggtttta attaataagc aagggaaatg atataaattt taatgaaaat 540
aaaagcggat tttggggaag acttccaatg tctgaaaaat cagttgaatc tgggcttgta 600
accgcatatc cttttggttc tagcgatgct aaaaaagtga ttgaagcttt tgcttctctt 660
tataataatg gaacttggag tgatatgatt gccgagatta ctattaagtc aaagcaatat 720
ccaaaaaatg aaaaagttaa cagaattacg cttgattctc agctttttta tgttgctatg 780
aaaaaaataa ttgaaaaata tcctaaaata aaaagtgcaa gttttgcatt taattcgta 840
attaactaa 849

<210> 96

<211> 282

<212> PRT

<213> *Borrelia burgdorferi*

<400> 96

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20 25 30
Arg Glu Ser Gly Ser Asp Arg Arg Gly Gln Glu Asn Arg Ala Leu Gly
35 40 45

Ala Met Asn Phe Gly Leu Phe Ser Gly Asp Ser Gly Val Val Tyr Asp
 50 55 60
 Leu Gln Asn Tyr Glu Thr Leu Lys Ala Leu Glu Asn Lys Asn Lys Phe
 65 70 75 80
 Ile Asp Tyr Ser Lys Ile Glu Phe Leu Glu Gly Thr Lys Ser Ile Asn
 85 90 95
 Ala Phe Ile Trp Ala Val Ser Val Arg Trp Ile Lys Ile Lys Ala Arg
 100 105 110
 Asp Leu Phe Gly Glu Cys Gly Asp Phe Ile Lys Glu Leu Lys Gly Ile
 115 120 125
 Lys Tyr Ser Tyr Leu Val Ser Pro Val Asp Gly Ser Tyr Ile Ser Tyr
 130 135 140
 Ala Met Pro Ile Ile Val Phe Glu Thr Thr Arg Glu Ser Asp Pro Leu
 145 150 155 160
 Tyr Ser Val Ser Gly Phe Lys Leu Ile Ser Lys Gly Asn Asp Ile Asn
 165 170 175
 Phe Asn Glu Asn Lys Ser Gly Phe Trp Gly Arg Leu Pro Met Ser Glu
 180 185 190
 Lys Ser Val Glu Ser Gly Leu Val Thr Ala Tyr Pro Phe Gly Ser Ser
 195 200 205
 Asp Ala Lys Lys Val Ile Glu Ala Phe Ala Ser Leu Tyr Asn Asn Gly
 210 215 220
 Thr Trp Ser Asp Met Ile Ala Glu Ile Thr Ile Lys Ser Lys Gln Tyr
 225 230 235 240
 Pro Lys Asn Glu Lys Val Tyr Arg Ile Thr Leu Asp Ser Gln Leu Phe
 245 250 255
 Asn Val Ala Met Lys Lys Ile Ile Glu Lys Tyr Pro Lys Ile Lys Ser
 260 265 270
 Ala Ser Phe Ala Phe Asn Ser Leu Ile Asn
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<210> 97

<211> 321

<212> DNA

<213> *Borrelia burgdorferi*

<400> 97

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 aatattgaaa ttttgtataa ttcagaagcc atagaagtag atggtaaadc ttctgtttct 180
 tcggttaaga tttttaataa aaaagataat gttgtttatg aattagaagt gagtgtctga 240

tttatggctg ttggctataa gccaaataca gaatttttaa agggattttt ggatttggac 300
gaaggcaatc gtttttaatt g 321

<210> 98
<211> 105
<212> PRT
<213> *Borrelia burgdorferi*

<400> 98
His Thr Ala Leu Ser Glu Ser Ile Tyr Leu Ser Lys Leu Val Asp Lys
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Val Tyr Leu Ile Val Arg Lys Asn Asn Leu Arg Ala Ile Ala Met Leu
20 25 30
Arg Asp Ser Val Ala Lys Leu Pro Asn Ile Glu Ile Leu Tyr Asn Ser
35 40 45
Glu Ala Ile Glu Val Asp Gly Lys Ser Ser Val Ser Ser Val Lys Ile
50 55 60
Phe Asn Lys Lys Asp Asn Val Val Tyr Glu Leu Glu Val Ser Ala Val
65 70 75 80
Phe Met Ala Val Gly Tyr Lys Pro Asn Thr Glu Phe Leu Lys Gly Phe
85 90 95
Leu Asp Leu Asp Glu Gly Asn Arg Phe
100 105

<210> 99
<211> 981
<212> DNA
<213> *Borrelia burgdorferi*

<400> 99
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gggatttatt ctgttatgag taattataag gctgctatct tggaagggtcc tgaacccggg 180
ggacagctta ctacaaccac agaagtttac aattatcctg gctttaaaaa tgaataaagt 240
ggtagaaatt tgatgttaaa tatgagggag caagtagtaa atcttggggc taaaactttt 300
cccgaaccg ttttttctat aaaaaggaag ggtaatatct tttaccttta tacagaaaat 360
tatatttata aaagtaaaagc tgttattatt gctgtgggat caaaaccaa aaaacttgaa 420
actcttaaaa attcgggttt attttggaa aaaggtatct ctgtttgtgc tatttgtgat 480
ggacatcttt ttaaaggga aagggttgca gtaattggtg gaggcaacac tgccctttca 540
gaatcaattt atttaagcaa attggtggac aagggttatc ttattgtaag aaaaaataat 600
cttagagcta ttgctatgtt aagagatagt gttgctaagt tacctaatat tgaaattttg 660
tataattcag aagccataga agtagatggt aaatcttctg tttcttcggt taagattttt 720
aataaaaaag ataattgtgt ttatgaatta gaagtgaagt ctgtatttat ggctgttggc 780
tataagccaa atacagaatt tttaaaggga tttttggatt tggacgaaga gggatttatt 840
gtcactaaag atgttggtta aacaagcgtt gatggtgttt tttcatgtgg agatgttagc 900
aataaacttt atgctcaagc cattactgct gctgctgagg gggtttattgc atctgttagc 960
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<210> 100
 <211> 326
 <212> PRT
 <213> *Borrelia burgdorferi*

<400> 100

Met	Leu	Glu	Phe	Glu	Thr	Ile	Asp	Ile	Asn	Leu	Thr	Lys	Lys	Lys	Asn
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Leu	Ser	Gln	Lys	Glu	Val	Asp	Phe	Ile	Glu	Asp	Val	Ile	Ile	Val	Gly
		20						25					30		
Ser	Gly	Pro	Ala	Gly	Leu	Thr	Ala	Gly	Ile	Tyr	Ser	Val	Met	Ser	Asn
		35					40					45			
Tyr	Lys	Ala	Ala	Ile	Leu	Glu	Gly	Pro	Glu	Pro	Gly	Gly	Gln	Leu	Thr
	50					55					60				
Thr	Thr	Thr	Glu	Val	Tyr	Asn	Tyr	Pro	Gly	Phe	Lys	Asn	Gly	Ile	Ser
	65					70				75					80
Gly	Arg	Asn	Leu	Met	Leu	Asn	Met	Arg	Glu	Gln	Val	Val	Asn	Leu	Gly
				85					90					95	
Ala	Lys	Thr	Phe	Pro	Glu	Thr	Val	Phe	Ser	Ile	Lys	Arg	Lys	Gly	Asn
			100					105					110		
Ile	Phe	Tyr	Leu	Tyr	Thr	Glu	Asn	Tyr	Ile	Tyr	Lys	Ser	Lys	Ala	Val
		115					120					125			
Ile	Ile	Ala	Val	Gly	Ser	Lys	Pro	Lys	Lys	Leu	Glu	Thr	Leu	Lys	Asn
	130					135					140				
Ser	Gly	Leu	Phe	Trp	Asn	Lys	Gly	Ile	Ser	Val	Cys	Ala	Ile	Cys	Asp
145					150					155					160
Gly	His	Leu	Phe	Lys	Gly	Lys	Arg	Val	Ala	Val	Ile	Gly	Gly	Gly	Asn
				165					170					175	
Thr	Ala	Leu	Ser	Glu	Ser	Ile	Tyr	Leu	Ser	Lys	Leu	Val	Asp	Lys	Val
			180					185					190		
Tyr	Leu	Ile	Val	Arg	Lys	Asn	Asn	Leu	Arg	Ala	Ile	Ala	Met	Leu	Arg
	195						200					205			
Asp	Ser	Val	Ala	Lys	Leu	Pro	Asn	Ile	Glu	Ile	Leu	Tyr	Asn	Ser	Glu
	210					215					220				
Ala	Ile	Glu	Val	Asp	Gly	Lys	Ser	Ser	Val	Ser	Ser	Val	Lys	Ile	Phe
225					230					235					240
Asn	Lys	Lys	Asp	Asn	Val	Val	Tyr	Glu	Leu	Glu	Val	Ser	Ala	Val	Phe
				245					250					255	
Met	Ala	Val	Gly	Tyr	Lys	Pro	Asn	Thr	Glu	Phe	Leu	Lys	Gly	Phe	Leu
			260					265					270		

Asp Leu Asp Glu Glu Gly Phe Ile Val Thr Lys Asp Val Val Lys Thr
 275 280 285

Ser Val Asp Gly Val Phe Ser Cys Gly Asp Val Ser Asn Lys Leu Tyr
 290 295 300

Ala Gln Ala Ile Thr Ala Ala Ala Glu Gly Phe Ile Ala Ser Val Glu
 305 310 315 320

Leu Gly Asn Phe Leu Lys
 325

<210> 101
 <211> 225
 <212> DNA
 <213> *Borrelia burgdorferi*

<400> 101
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 caaagcttaa ataaaaatgc agaacttaag ggtattttta attataaaaac aggaataact 180
 aaaatagtat tatacacaag gtttagaaac catagtataa cagaa 225

<210> 102
 <211> 75
 <212> PRT
 <213> *Borrelia burgdorferi*

<400> 102
 His Met Ile Leu Tyr Gln Asn Gln Leu Lys Phe Leu Lys Leu Leu Val
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 Phe Phe Leu Leu Ile Ser Cys Thr Ser Leu Asn Val Glu His Asp Gln
 20 25 30
 Phe Gly Lys Thr Phe Arg Ile Tyr Gln Ser Leu Asn Lys Asn Ala Glu
 35 40 45
 Leu Lys Gly Ile Phe Asn Tyr Lys Thr Gly Ile Thr Lys Ile Val Leu
 50 55 60
 Tyr Thr Arg Phe Arg Asn His Ser Ile Thr Glu
 65 70 75

<210> 103
 <211> 498
 <212> DNA
 <213> *Borrelia burgdorferi*

<400> 103
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 tcttgacatt ctttaaactg tgagcacgat caatttgga aaacatttag aatataccaa 120
 agcttaaata aaaatgcaga acttaagggt atttttaatt ataaaacagg aataactaaa 180
 atagtattat acacaagggt tagaaacat agtataacag aacagaatcc tttattgctg 240

ctggatggaa ctaaaattga gggaaaagta agctacaaaa gagataataa ccattttttt 300
 ggcaactgga ttaattattc atcatttggt ttgaccaa at ctttattgga aaggatgatt 360
 aaagaagaag atgcttctta taagaataag gaggttaaaa ttagaattgg attagaagat 420
 ttaagcttga aaaaatataa aattttggac tttctagtaa tggttgaatc gattgaaaat 480
 aaagattata aaagttaa 498

<210> 104

<211> 165

<212> PRT

<213> *Borrelia burgdorferi*

<400> 104

Met Ile Leu Tyr Gln Asn Gln Leu Lys Phe Leu Lys Leu Leu Val Phe

1 5 10 15

Phe Leu Leu Ile Ser Cys Thr Ser Leu Asn Val Glu His Asp Gln Phe

20 25 30

Gly Lys Thr Phe Arg Ile Tyr Gln Ser Leu Asn Lys Asn Ala Glu Leu

35 40 45

Lys Gly Ile Phe Asn Tyr Lys Thr Gly Ile Thr Lys Ile Val Leu Tyr

50 55 60

Thr Arg Phe Arg Asn His Ser Ile Thr Glu Gln Asn Pro Leu Leu Leu

65 70 75 80

Leu Asp Gly Thr Lys Ile Glu Gly Lys Val Ser Tyr Lys Arg Asp Asn

85 90 95

Asn His Phe Phe Gly Asn Trp Ile Asn Tyr Ser Ser Phe Val Leu Thr

100 105 110

Lys Ser Leu Leu Glu Arg Met Ile Lys Glu Glu Asp Ala Ser Tyr Lys

115 120 125

Asn Lys Glu Val Lys Ile Arg Ile Gly Leu Glu Asp Leu Ser Leu Lys

130 135 140

Lys Tyr Lys Ile Leu Asp Phe Leu Val Met Val Glu Ser Ile Glu Asn

145 150 155 160

Lys Asp Tyr Lys Ser

165

<210> 105

<211> 896

<212> DNA

<213> *Borrelia burgdorferi*

<400> 105

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ggaggcaatg atgtttacgt ttctccctct cagattagac tttttaattt aaggacaggt 120

gatattttat atggccaaat tagatcgctt agagatgggtg agagattttt tgcaatgggt 180

aaaattaaat ctattaatga tcaagatcct acgtttgctc aaaacagaat accttttgat 240

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aatttaactc ctctttatcc caatgtgaaa ttgaatcttg aatatgaaaa ttgcaatatt 300
tctacaaggc ttattaatct tttttcacct ataggtaagg ggcaaagggc tttaatagtt 360
tctcctccaa aagcgggaaa gactaccctg cttcaaaaaa tagctaatagc aataactact 420
aattattcag atgttatttt aatgatacta cttattgatg agaggccaga agaagttaca 480
gatatgattc gtagcgtaa aggcgaaagta attgcatcta attttgatga gcaggctagt 540
aggcatgttc aggtagcaga gatgggttatt gaaaaggcta aaaggccttg tgaaaacaaa 600
aaagatgttg ttattttgct tgattctatt acaaggcctg caagggcata taatcaaact 660
atgccaaactt ctggtaaaaat tttatcgggt ggggtagatt ctaatgctct tcataagcca 720
aagaggtttt ttgggtctgc tagaaatata gaagaagggg gaagtttaac tattatagct 780
actgctttgg ttgatactgg tagtaaaatg gatgaagtta tttttgaaga atttaaaagt 840
accggttaata tggaattaat tcttgataga agtttggcag acagaagact ttttcc 896

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<210> 106

<211> 298

<212> PRT

<213> *Borrelia burgdorferi*

<400> 106

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Leu Asp Val Leu Ser Asp Gly Tyr Gly Phe Leu Arg Thr Ala Ser Asn
 1              5              10              15

```

```

Ser Tyr Leu Ser Gly Gly Asn Asp Val Tyr Val Ser Pro Ser Gln Ile
          20              25              30

```

```

Arg Leu Phe Asn Leu Arg Thr Gly Asp Ile Leu Tyr Gly Gln Ile Arg
          35              40              45

```

```

Ser Pro Arg Asp Gly Glu Arg Phe Phe Ala Met Val Lys Ile Lys Ser
          50              55              60

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```

Ile Asn Asp Gln Asp Pro Thr Phe Ala Gln Asn Arg Ile Pro Phe Asp
          65              70              75              80

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```

Asn Leu Thr Pro Leu Tyr Pro Asn Val Lys Leu Asn Leu Glu Tyr Glu
          85              90              95

```

```

Asn Cys Asn Ile Ser Thr Arg Leu Ile Asn Leu Phe Ser Pro Ile Gly
          100              105              110

```

```

Lys Gly Gln Arg Ala Leu Ile Val Ser Pro Pro Lys Ala Gly Lys Thr
          115              120              125

```

```

Thr Leu Leu Gln Lys Ile Ala Asn Ala Ile Thr Thr Asn Tyr Ser Asp
          130              135              140

```

```

Val Ile Leu Met Ile Leu Leu Ile Asp Glu Arg Pro Glu Glu Val Thr
          145              150              155              160

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```

Asp Met Ile Arg Ser Val Lys Gly Glu Val Ile Ala Ser Asn Phe Asp
          165              170              175

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```

Glu Gln Ala Ser Arg His Val Gln Val Ala Glu Met Val Ile Glu Lys
          180              185              190

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```

Ala Lys Arg Leu Val Glu Asn Lys Lys Asp Val Val Ile Leu Leu Asp
          195              200              205

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Ser	Ile	Thr	Arg	Leu	Ala	Arg	Ala	Tyr	Asn	Gln	Thr	Met	Pro	Thr	Ser
210						215					220				
Gly	Lys	Ile	Leu	Ser	Gly	Gly	Val	Asp	Ser	Asn	Ala	Leu	His	Lys	Pro
225					230					235				240	
Lys	Arg	Phe	Phe	Gly	Ser	Ala	Arg	Asn	Ile	Glu	Glu	Gly	Gly	Ser	Leu
				245				250						255	
Thr	Ile	Ile	Ala	Thr	Ala	Leu	Val	Asp	Thr	Gly	Ser	Lys	Met	Asp	Glu
			260					265					270		
Val	Ile	Phe	Glu	Glu	Phe	Lys	Ser	Thr	Gly	Asn	Met	Glu	Leu	Ile	Leu
		275					280					285			
Asp	Arg	Ser	Leu	Ala	Asp	Arg	Arg	Leu	Phe						
290						295									

<210> 107
 <211> 1548
 <212> DNA
 <213> *Borrelia burgdorferi*

<400> 107

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gattctgcat	ctagcgtgac	aaaatctgca	gatttaagtg	gcgtaaagga	ttcaaacggg	180
gtaatatatt	ctgattttga	ttatgatatt	ccttcttcag	gtttagaaaa	taatattaaa	240
acttttagag	aaagtaatat	catcaaattt	tttaattggt	aagattatgt	agagattgaa	300
aaactttatg	ataagccaat	tacagaggtt	agaaaaattg	ttgaaggctt	tgggaccaat	360
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gggtttttga	gaactgcatc	aaattcttat	ctttctggag	gcaatgatgt	ttacgtttct	540
ccctctcaga	ttagactttt	taatttaagg	acaggtgata	ttttatatgg	ccaaattaga	600
tcgcctagag	atgggtgagag	attttttgca	atgggttaaaa	ttaaactctat	taatgatcaa	660
gatcctacgt	ttgctcaaaa	cagaatacct	tttgataatt	taactcctct	ttatcccaat	720
gtgaaattga	atcttgaata	tgaaaattgc	aatattttcta	caaggcttat	taatcttttt	780
tcacctatag	gtaaggggca	aagggtctta	atagttttctc	ctccaaaagc	gggaaagact	840
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atactactta	ttgatgagag	gccagaagaa	gttacagata	tgattcgtag	cgttaaaggc	960
gaagtaattg	catctaattt	tgatgagcag	gctagtaggc	atgttcaggt	agcagagatg	1020
gttattgaaa	aggctaaaag	gcttggtgaa	aacaaaaaag	atgttggtat	tttgcttgat	1080
tctattacaa	ggcttgcaag	ggcatataat	caaactatgc	caacttctgg	taaaatttta	1140
tcgggtgggg	tagattctaa	tgctcttcat	aagccaaaga	ggttttttgg	gtctgctaga	1200
aatatagaag	aagggggaag	tttaactatt	atagctactg	ctttgggttg	tactggtagt	1260
aaaatggatg	aagttatttt	tgaagaattt	aaaagtaccg	gtaatatgga	attaattctt	1320
gatagaagtt	tggcagacag	aagacttttt	cctgctatta	atattaaaaa	gtcaggtacc	1380
agaaaagaag	aattgcttct	tagtgaagag	gagcgttcta	agattttgct	tattagaaga	1440
atacttggag	gtgttgatga	ttatgaggga	gttgaagttc	tgatagaaaa	gatgaaaaaa	1500
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<210> 108
 <211> 515
 <212> PRT

<213> Borrelia burgdorferi

<400> 108

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Leu	Asp	Val	Ser	Lys	Glu	Phe	Lys	Ile	Glu	Asp	Asn	Leu	Lys	Lys	Lys
			20					25					30		
Val	Val	Lys	Val	Val	Ala	Lys	Lys	Asp	Ser	Ala	Ser	Ser	Val	Thr	Lys
		35					40					45			
Ser	Ala	Asp	Leu	Ser	Gly	Val	Lys	Asp	Ser	Asn	Gly	Val	Ile	Phe	Ser
	50					55					60				
Asp	Phe	Asp	Tyr	Asp	Ile	Pro	Ser	Ser	Gly	Leu	Glu	Asn	Asn	Ile	Lys
65					70					75					80
Thr	Leu	Glu	Gln	Ser	Asn	Ile	Ile	Lys	Phe	Phe	Asn	Gly	Lys	Asp	Tyr
				85					90					95	
Val	Glu	Ile	Glu	Lys	Leu	Tyr	Asp	Lys	Pro	Ile	Thr	Glu	Val	Arg	Lys
			100					105					110		
Ile	Val	Glu	Gly	Leu	Gly	Thr	Asn	His	Thr	Ile	Ala	Val	Thr	Met	Lys
	115						120					125			
Lys	Thr	Glu	Leu	Ile	Phe	Leu	Leu	Val	Lys	Ile	Leu	Ser	Glu	Asn	Asn
	130					135					140				
Ile	Asp	Val	Leu	Phe	Thr	Gly	Val	Leu	Asp	Val	Leu	Ser	Asp	Gly	Tyr
145					150					155					160
Gly	Phe	Leu	Arg	Thr	Ala	Ser	Asn	Ser	Tyr	Leu	Ser	Gly	Gly	Asn	Asp
				165					170					175	
Val	Tyr	Val	Ser	Pro	Ser	Gln	Ile	Arg	Leu	Phe	Asn	Leu	Arg	Thr	Gly
			180					185					190		
Asp	Ile	Leu	Tyr	Gly	Gln	Ile	Arg	Ser	Pro	Arg	Asp	Gly	Glu	Arg	Phe
	195						200					205			
Phe	Ala	Met	Val	Lys	Ile	Lys	Ser	Ile	Asn	Asp	Gln	Asp	Pro	Thr	Phe
	210					215					220				
Ala	Gln	Asn	Arg	Ile	Pro	Phe	Asp	Asn	Leu	Thr	Pro	Leu	Tyr	Pro	Asn
225					230					235					240
Val	Lys	Leu	Asn	Leu	Glu	Tyr	Glu	Asn	Cys	Asn	Ile	Ser	Thr	Arg	Leu
			245						250					255	
Ile	Asn	Leu	Phe	Ser	Pro	Ile	Gly	Lys	Gly	Gln	Arg	Ala	Leu	Ile	Val
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<213> *Borrelia burgdorferi*

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50 55 60
Val Lys Gly Asn Asn Glu Lys Glu Lys Ala Glu Gly Ala Ile Lys Glu
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Lys Ala Ala Ala Ala Glu Gly Glu Asn Asn Lys Lys Ala Gly Lys Leu
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Phe Gly Lys Val Asp Gly Ala Ala Gly Asp Ser Glu Ala Ala Ser Lys
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Ala Ala Gly Ala Val Ser Ala Val Ser Gly Glu Gln Ile Leu Ser Ala
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Asp Ala Lys Asn Pro Ile Ala Ala Ala Ile Gly Lys Gly Asn Gly Asp
115 120 125

Gly Ala Glu Phe Asp Gln Asp Glu Met Lys Lys Asp Asp Gln Ile Ala
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Gly Ile Ala Lys Gly Ile Lys Glu Ile Val Glu Ala Ala Arg Gly Ser
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Glu Lys Leu Lys Val Ala Ala Ala Lys Glu Gly Asn Glu Lys Ala Gly
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Lys Leu Phe Gly Lys Ala Gly Ala Asn Ala His Gly Asp Ser Glu Ala
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Ala Ser Lys Ala Ala Gly Ala Val Ser Ala Val Ser Gly Glu Gln Ile
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Leu Ser Ala Ile Val Lys Ala Ala Asp Ala Ala Glu Gln Asp Gly Lys
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Lys Pro Ala Asp Ala Thr Asn Pro Ile Ala Ala Ala Ile Gly Asn Lys
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Asp Glu Asp Ala Asp Phe Gly Asp Gly Met Lys Lys Asp Asp Gln Ile
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Val Lys Gly Asn Asn Glu Lys Gly Lys Ala
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<212> DNA

<213> *Borrelia burgdorferi*

<400> 115

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tgctattgga aagggtgatg aggatgcgga ttttggtaat gagatgaaga aggatggaaa 8220
gtttgctttg ctaactttct aagttctaag ttactaggac agacaatcat tcactactaa 8280
agattcacia gatttatttt aaatagttct taccttgatt ttattttttt ataaattaag 8340
aaaatagaat actcttttaa aaaagaattc 8370

<210> 116
<211> 1071
<212> DNA
<213> *Borrelia burgdorferi*

<400> 116
atgaaaaaaaaa tttcaagtgc aattttatta acaactttct ttgtttttat taattgtaaa 60
agccaagttg ctgataagga cgaccaaca aacaaatttt accaatctgt catacaatta 120
ggtaacggat ttcttgatgt attcacatct tttggtgggt tagtagcaga ggcttttgga 180
tttaaatcag atccaaaaaa atctgatgta aaaacctatt ttactactgt agctgccaaa 240
ttggaaaaaa caaaaaccga tcttaatagt ttgcctaagg aaaaaagcga tataagtagt 300
acgacgggga aaccagatag tacaggttct gttggaactg ccgttgaggg ggctattaag 360
gaagttagcg agttgttgga taagctggtg aaagctgtaa agacagctga gggggcttca 420
agtgggtactg ctgcaattgg agaagttgtg gctgatgctg atgctgcaaa ggttgctgat 480
aaggcgagtg tgaaggggat tgctaagggg ataaaggaga ttgttgaagc tgctgggggg 540
agtgaagaagc tgaaagctgt tgctgctgct aaaggggaga ataataaagg ggcagggaag 600
ttgttttgga aggctggtgc tgctgctcat ggggacagtg aggctgctag caaggcggct 660
ggtgctgtta gtgctgttag tggggagcag atattaagtg cgattgttac ggctgctgat 720
gcggctgagc aggatggaaa gaagcctgag gaggctaaaa atccgattgc tgctgctatt 780
ggggataaag atgggggtgc ggagtttggg caggatgaga tgaagaagga tgatcagatt 840
gctgctgcta ttgctttgag ggggatggct aaggatggaa agtttgctgt gaaggatggt 900
gagaaagaga aggctgaggg ggctattaag ggagctgctg agtctgcagt tcgcaaagtt 960
ttaggggcta ttactgggct aataggagac gccgtgagtt ccgggctaag gaaagtcggt 1020
gattcagtga aggctgctag taaagaaaca cctcctgcct tgaataagtg a 1071

<210> 117
<211> 356
<212> PRT
<213> *Borrelia burgdorferi*

<400> 117
Met Lys Lys Ile Ser Ser Ala Ile Leu Leu Thr Thr Phe Phe Val Phe
1 5 10 15
Ile Asn Cys Lys Ser Gln Val Ala Asp Lys Asp Asp Pro Thr Asn Lys
20 25 30
Phe Tyr Gln Ser Val Ile Gln Leu Gly Asn Gly Phe Leu Asp Val Phe
35 40 45
Thr Ser Phe Gly Gly Leu Val Ala Glu Ala Phe Gly Phe Lys Ser Asp
50 55 60
Pro Lys Lys Ser Asp Val Lys Thr Tyr Phe Thr Thr Val Ala Ala Lys

65		70		75		80									
Leu	Glu	Lys	Thr	Lys	Thr	Asp	Leu	Asn	Ser	Leu	Pro	Lys	Glu	Lys	Ser
				85					90					95	
Asp	Ile	Ser	Ser	Thr	Thr	Gly	Lys	Pro	Asp	Ser	Thr	Gly	Ser	Val	Gly
			100					105					110		
Thr	Ala	Val	Glu	Gly	Ala	Ile	Lys	Glu	Val	Ser	Glu	Leu	Leu	Asp	Lys
		115					120					125			
Leu	Val	Lys	Ala	Val	Lys	Thr	Ala	Glu	Gly	Ala	Ser	Ser	Gly	Thr	Ala
	130					135					140				
Ala	Ile	Gly	Glu	Val	Val	Ala	Asp	Ala	Asp	Ala	Ala	Lys	Val	Ala	Asp
145					150					155					160
Lys	Ala	Ser	Val	Lys	Gly	Ile	Ala	Lys	Gly	Ile	Lys	Glu	Ile	Val	Glu
				165					170					175	
Ala	Ala	Gly	Gly	Ser	Glu	Lys	Leu	Lys	Ala	Val	Ala	Ala	Ala	Lys	Gly
			180					185					190		
Glu	Asn	Asn	Lys	Gly	Ala	Gly	Lys	Leu	Phe	Gly	Lys	Ala	Gly	Ala	Ala
		195					200					205			
Ala	His	Gly	Asp	Ser	Glu	Ala	Ala	Ser	Lys	Ala	Ala	Gly	Ala	Val	Ser
	210					215					220				
Ala	Val	Ser	Gly	Glu	Gln	Ile	Leu	Ser	Ala	Ile	Val	Thr	Ala	Ala	Asp
225					230					235					240
Ala	Ala	Glu	Gln	Asp	Gly	Lys	Lys	Pro	Glu	Glu	Ala	Lys	Asn	Pro	Ile
				245					250					255	
Ala	Ala	Ala	Ile	Gly	Asp	Lys	Asp	Gly	Gly	Ala	Glu	Phe	Gly	Gln	Asp
			260					265					270		
Glu	Met	Lys	Lys	Asp	Asp	Gln	Ile	Ala	Ala	Ala	Ile	Ala	Leu	Arg	Gly
		275				280						285			
Met	Ala	Lys	Asp	Gly	Lys	Phe	Ala	Val	Lys	Asp	Gly	Glu	Lys	Glu	Lys
	290					295					300				
Ala	Glu	Gly	Ala	Ile	Lys	Gly	Ala	Ala	Glu	Ser	Ala	Val	Arg	Lys	Val
305					310					315					320
Leu	Gly	Ala	Ile	Thr	Gly	Leu	Ile	Gly	Asp	Ala	Val	Ser	Ser	Gly	Leu
				325					330					335	
Arg	Lys	Val	Gly	Asp	Ser	Val	Lys	Ala	Ala	Ser	Lys	Glu	Thr	Pro	Pro
			340					345					350		
Ala	Leu	Asn	Lys												
		355													

<210> 118
 <211> 936
 <212> DNA
 <213> *Borrelia burgdorferi*

<400> 118
 cgcaacgatg tttttggggt gcaaataagca gcagctttaa aaaatgtgtt tgctattgca 60
 tttggaattt tggatgccta taaattgaat tatcctaatt taataggtaa taatacagaa 120
 tcatttttat tttcaatatc cttaaataat ataaaagata ttgcaatgga gcttggggga 180
 agaaatattg aaacgttttt atttttgtct gggtctggcg atttagatgt tacttgtaga 240
 agcatgtttg gaagaaatag acgatttggc ctaatagcat tggaatgata gttatattca 300
 caacaataag ggttccaagc tttattatgg ctgaagcatt tttatccttt ttaggacttg 360
 gaatttcagc tccaatgaca agctggggag aattagtgc aaatggaatt gctacatttg 420
 ttgaatatcc atggaaagt tttattccag ctatagttat gacaatattt ctattattta 480
 tgaacttttt aggtgatggg ctaagggatg cttttgatcc aaaagatagc atctaaggag 540
 aaattgaatg gaaaaagaaa atatattgga aataaaaaat ttaacaattg aatttagatt 600
 aaaacatata acaattcatc ccgtaagcaa tgtaaaccta tctgtaaaaa gaggagaaat 660
 tagagctatt gttggagaat ctggaagcgg aaaatccgta acaagtatgg ctatttttaa 720
 attattacca gaacttaca cagtatataa aagtggagaa atactatttg aaaatcaaga 780
 tctgctaaaa cttagcgaag aagaactttt aaaaatcaga gggaataaaa tatcaatgat 840
 atttcaagac ccaatgactt cattaaaccc atttttaaga atatcaactc aacttgaaga 900
 aacaataatc ttacaccaag gattagggaa aaaaga 936

<210> 119
 <211> 95
 <212> PRT
 <213> *Borrelia burgdorferi*

<400> 119
 Arg Asn Asp Val Phe Gly Val Gln Ile Ala Ala Ala Leu Lys Asn Val
 1 5 10 15
 Phe Ala Ile Ala Phe Gly Ile Leu Asp Ala Tyr Lys Leu Asn Tyr Pro
 20 25 30
 Asn Leu Ile Gly Asn Asn Thr Glu Ser Phe Leu Phe Ser Ile Ser Leu
 35 40 45
 Asn Asn Ile Lys Asp Ile Ala Met Glu Leu Gly Gly Arg Asn Ile Glu
 50 55 60
 Thr Phe Leu Phe Leu Ser Gly Ser Gly Asp Leu Asp Val Thr Cys Arg
 65 70 75 80
 Ser Met Phe Gly Arg Asn Arg Arg Phe Gly Leu Ile Ala Leu Glu
 85 90 95

<210> 120
 <211> 1092
 <212> DNA
 <213> *Borrelia burgdorferi*

<400> 120
 atgagttttt ataaggttat agggggagta tttatgaaaa tatcagtaat aggggcaggt 60
 gcttggggaa cagctatttc aaagtctttg gcagataaat ttgattttta tattttttta 120

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tgggtctttg aagaagatgt taagaatgat attaataatg ataatgttaa tactaaatat 180
ttaaagggaa ttaaattgcc aaaaaattta gttgcaagtt cagatttatt tgaagttgta 240
acaatgtctg attatatttt cattgcaaca ctttctcttt ttaccgttga tatttttaaaa 300
aaattggatc aattttttaca ttttctggag ataaaaccaa agctagcaat acttacaaaa 360
gggtttatta cttttgatgg taaaactcag acagttattg aagctgctga gagaattatg 420
aaaggatata aagacgaaat tacttatatt gttggtccaa gtcagtctga ggaagttggg 480
cttgggtgta taacagggct tgttgcggt agtaataaca gagaaaatgc atatttggtt 540
attaatttat ttagtaaaac cccaatttct ttattttata gcaacgatgt ttttgggggtg 600
caaatagcag cagctttaa aaatgtgttt gctattgcat ttggaatttt ggatgcctat 660
aaattgaatt atcctaattt aataggtaat aatacagaat catttttatt ttcaatatcc 720
ttaaataata taaaagatat tgcaatggag cttgggggaa gaaatattga aacgttttta 780
tttttgctcg gttctggcga tttagatggt acttgtagaa gcatgttttg aagaaataga 840
cgatttggca atgaaattgt tagcaaaaac atttttagaaa gctttttaag tatagatgac 900
ttgataagta atattgaaaa aattggatat ttaccagagg gagttttggc tgctaaatca 960
atttttttct tttttaaaca attaaatcgt gatctcaatc ctaatagttt gttaagcgtt 1020
atatataaaa ttttgaataa agagttggag cccaaatctg ttattgagta tatgagagat 1080
gtagacaat aa 1092

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<210> 121
 <211> 363
 <212> PRT
 <213> *Borrelia burgdorferi*

<400> 121
 Met Ser Phe Tyr Lys Val Ile Gly Gly Val Phe Met Lys Ile Ser Val
 1 5 10 15
 Ile Gly Ala Gly Ala Trp Gly Thr Ala Ile Ser Lys Ser Leu Ala Asp
 20 25 30
 Lys Phe Asp Phe Asn Ile Phe Leu Trp Val Phe Glu Glu Asp Val Lys
 35 40 45
 Asn Asp Ile Asn Asn Asp Asn Val Asn Thr Lys Tyr Leu Lys Gly Ile
 50 55 60
 Lys Leu Pro Lys Asn Leu Val Ala Ser Ser Asp Leu Phe Glu Val Val
 65 70 75 80
 Thr Met Ser Asp Tyr Ile Phe Ile Ala Thr Pro Ser Leu Phe Thr Val
 85 90 95
 Asp Ile Leu Lys Lys Leu Asp Gln Phe Leu His Phe Leu Glu Ile Lys
 100 105 110
 Pro Lys Leu Ala Ile Leu Thr Lys Gly Phe Ile Thr Phe Asp Gly Lys
 115 120 125
 Thr Gln Thr Val Ile Glu Ala Ala Glu Arg Ile Met Lys Gly Tyr Lys
 130 135 140
 Asp Glu Ile Thr Tyr Ile Val Gly Pro Ser His Ala Glu Glu Val Gly
 145 150 155 160
 Leu Gly Val Ile Thr Gly Leu Val Ala Ala Ser Asn Asn Arg Glu Asn
 165 170 175

Ala Tyr Leu Phe Ile Asn Leu Phe Ser Lys Thr Pro Ile Ser Leu Phe
 180 185 190
 Tyr Ser Asn Asp Val Phe Gly Val Gln Ile Ala Ala Ala Leu Lys Asn
 195 200 205
 Val Phe Ala Ile Ala Phe Gly Ile Leu Asp Ala Tyr Lys Leu Asn Tyr
 210 215 220
 Pro Asn Leu Ile Gly Asn Asn Thr Glu Ser Phe Leu Phe Ser Ile Ser
 225 230 235 240
 Leu Asn Asn Ile Lys Asp Ile Ala Met Glu Leu Gly Gly Arg Asn Ile
 245 250 255
 Glu Thr Phe Leu Phe Leu Ser Gly Ser Gly Asp Leu Asp Val Thr Cys
 260 265 270
 Arg Ser Met Phe Gly Arg Asn Arg Arg Phe Gly Asn Glu Ile Val Ser
 275 280 285
 Lys Asn Ile Leu Glu Ser Phe Leu Ser Ile Asp Asp Leu Ile Ser Asn
 290 295 300
 Ile Glu Lys Ile Gly Tyr Leu Pro Glu Gly Val Leu Ala Ala Lys Ser
 305 310 315 320
 Ile Phe Phe Phe Phe Lys Gln Leu Asn Arg Asp Leu Asn Pro Asn Ser
 325 330 335
 Leu Leu Ser Val Ile Tyr Lys Ile Leu Asn Lys Glu Leu Glu Pro Lys
 340 345 350
 Ser Val Ile Glu Tyr Met Arg Asp Val Arg Gln
 355 360

<210> 122

<211> 211

<212> DNA

<213> *Borrelia burgdorferi*

<400> 122

cttaaaattt caagggcacc tatttcgttt ggatttgttt ttaataggga aattgctctt 60
 tcgattaatt ttgcggttct ctcacatctt tttttgattt tccctatatt ttacattt 120
 gtaagtttta atgctatttt aaaaaataaa aacactaaaa taaatactgt caatgaagag 180
 attactataa atagtgcacaa cactcgtatt g 211

<210> 123

<211> 70

<212> PRT

<213> *Borrelia burgdorferi*

<400> 123

Leu Lys Ile Ser Arg Ala Pro Ile Ser Phe Gly Phe Val Phe Asn Arg

1 5 10 15
 Glu Ile Ala Leu Ser Ile Asn Phe Arg Val Leu Ser Ser Ser Phe Leu
 20 25 30
 Ile Phe Pro Ile Phe Leu Pro Ile Val Ser Phe Asn Ala Ile Leu Lys
 35 40 45
 Asn Lys Asn Thr Lys Ile Asn Thr Val Asn Glu Glu Ile Thr Ile Asn
 50 55 60
 Ser Asp Asn Thr Arg Ile
 65 70

<210> 124
 <211> 727
 <212> DNA
 <213> *Borrelia burgdorferi*

<400> 124
 cgaattaatt tttttatttt atttttttat aataaaataa gtccagcatt agtaattata 60
 cttagtggat ttttttatac attaatataa atatgattaa acaaaaatta aaaatatctc 120
 aaaattttaa ctcaattcaa atacaaacaa taaaaatatt aagccttaac caaaaagaat 180
 taacaaagct tatactagaa gaaagcgaaa ataatgaatg tctagaaata aactcaaata 240
 aaatattttt tgaaacattg aaaacatata ggttttaaaaa agttttttat aaagaagatg 300
 atatgataaa aaatcaacac gacatagctc ttgaaaaaac acaaacaaat acttctttta 360
 aagaacacct tttactgcaa ttaagaattc aaagaataaa tgaagatgaa attaaaatag 420
 gcgaaatact cataaacaat ctaaacagca aagggttttca tataataaac ccttacgatc 480
 ttttttaaaaa ggaagaaaaa gaaaaagtaa aaaaaataat tgaacttatt caaaaatttg 540
 atccaattgg aatttgtgtc cccaacataa tagaatcggt aattttgcaa gcaaagcatc 600
 ataaattaga aactaatatt attaaaattc ttgaaaaagc agagcttctt gaaaaaactc 660
 aaaaaaagtt aaaagaggaa cttaaataa gaagcaaaga atttaacacg gctttagaaa 720
 ttatcag 727

<210> 125
 <211> 29
 <212> PRT
 <213> *Borrelia burgdorferi*

<400> 125
 Arg Ile Asn Phe Phe Ile Leu Phe Phe Tyr Asn Lys Ile Ser Pro Ala
 1 5 10 15
 Leu Val Ile Ile Leu Ser Gly Phe Phe Tyr Thr Leu Ile
 20 25

<210> 126
 <211> 534
 <212> DNA
 <213> *Borrelia burgdorferi*

<400> 126
 ttgattttta taaatttatt cattacattc ttaaaaatcg gattattaaa tttcggaggc 60
 ggtaatggaa ttgcagcaat aataaacaac gaaataatta ataataaaca ttggataaca 120

aaagaagaat ttgtcaatat gattacaata tcaagaataa cccctggggcc tattgcaaca 180
 aacatagcaa catacgttgg aatgaaaact gcaggaattg cgggagcaat aattgctaca 240
 gtagcattaa taacagcccc aataataata atgattataa tcctcctaact actacataaa 300
 atcggttttt taaattattg cctagaaaat ctaaaaccta ttattgttgc gctgtggata 360
 attacaataa tcatttttgc tgaaaataca tattttaaaaa tagaaaacaa caaaacagaa 420
 cttttgaaaa ctctggctat tgtaggaatt aattttttta ttttattttt ttataataaa 480
 ataagtccag cattagtaat tatacttagt ggattttttt atacattaat ataa 534

<210> 127

<211> 177

<212> PRT

<213> *Borrelia burgdorferi*

<400> 127

Met Ile Leu Ile Asn Leu Phe Ile Thr Phe Leu Lys Ile Gly Leu Leu
 1 5 10 15

Asn Phe Gly Gly Gly Asn Gly Ile Ala Ala Ile Ile Asn Asn Glu Ile
 20 25 30

Ile Asn Asn Lys His Trp Ile Thr Lys Glu Glu Phe Val Asn Met Ile
 35 40 45

Thr Ile Ser Arg Ile Thr Pro Gly Pro Ile Ala Thr Asn Ile Ala Thr
 50 55 60

Tyr Val Gly Met Lys Thr Ala Gly Ile Ala Gly Ala Ile Ile Ala Thr
 65 70 75 80

Val Ala Leu Ile Thr Ala Pro Ile Ile Ile Met Ile Ile Ile Leu Leu
 85 90 95

Ile Leu His Lys Ile Gly Phe Leu Asn Tyr Cys Leu Glu Asn Leu Lys
 100 105 110

Pro Ile Ile Val Ala Leu Trp Ile Ile Thr Ile Ile Ile Leu Leu Glu
 115 120 125

Asn Thr Tyr Leu Lys Ile Glu Asn Asn Lys Thr Glu Leu Leu Lys Thr
 130 135 140

Leu Ala Ile Val Gly Ile Asn Phe Phe Ile Leu Phe Phe Tyr Asn Lys
 145 150 155 160

Ile Ser Pro Ala Leu Val Ile Ile Leu Ser Gly Phe Phe Tyr Thr Leu
 165 170 175

Ile

<210> 128

<211> 213

<212> DNA

<213> *Borrelia burgdorferi*

<400> 128
cctagtaata tatcaacaat gaaaaaatac ttaaatacaat tagaaaaaga aataaaaaatc 60
atagcaaaat tctatttttaa aaacgatcaa tctctaattt attgcaaact taattataacc 120
ctagaaaaaa tttgttttaa actaataaaa ttctacaaaa aattctacaa agaattaaaa 180
caatttacac aaaagaacat tactacttaa ttg 213

<210> 129
<211> 69
<212> PRT
<213> *Borrelia burgdorferi*

<400> 129
Pro Ser Asn Ile Ser Thr Met Lys Lys Tyr Leu Asn Gln Leu Glu Lys
1 5 10 15
Glu Ile Lys Ile Ile Ala Lys Phe Tyr Phe Lys Asn Asp Gln Ser Leu
20 25 30
Ile Tyr Cys Lys Leu Asn Tyr Thr Leu Glu Lys Ile Cys Leu Lys Leu
35 40 45
Ile Lys Phe Tyr Lys Lys Phe Tyr Lys Glu Leu Lys Gln Phe Thr Gln
50 55 60
Lys Asn Ile Thr Thr
65

<210> 130
<211> 444
<212> DNA
<213> *Borrelia burgdorferi*

<400> 130
ttgggaaatt atcaatactt ttttaattta ttctttattt tcaaaataat ctttatatac 60
ttatatatta tgtataaggc tataaaagaa caacaagaaa tagaaataga tcatgcatgc 120
agaatactta ttcttaccgc aacaatattt gaaataaatt caatattcga aaattattat 180
caaaaaactc tactcaaaaa gtataacgaa aatctcaaaa acaaaaatct acctcctagt 240
aatatatcaa caatgaaaaa atacttaa atacttagaaa aagaaataaa aatcatagca 300
aaattctatt ttaaaaacga tcaatctcta atttattgca aacttaatta taccctagaa 360
aaaatttggt taaaactaat aaaattctac aaaaaattct acaaagaatt aaaacaattt 420
acacaaaaga acattactac ttaa 444

<210> 131
<211> 147
<212> PRT
<213> *Borrelia burgdorferi*

<400> 131
Met Gly Asn Tyr Gln Tyr Phe Phe Asn Leu Phe Phe Ile Phe Lys Ile
1 5 10 15
Ile Phe Ile Tyr Leu Tyr Ile Met Tyr Lys Ala Ile Lys Glu Gln Gln
20 25 30

Glu Ile Glu Ile Asp His Ala Cys Arg Ile Leu Ile Leu Thr Ala Thr
 35 40 45
 Ile Phe Glu Ile Asn Ser Ile Phe Glu Asn Tyr Tyr Gln Lys Thr Leu
 50 55 60
 Leu Lys Lys Tyr Asn Glu Asn Leu Lys Asn Lys Asn Leu Pro Pro Ser
 65 70 75 80
 Asn Ile Ser Thr Met Lys Lys Tyr Leu Asn Gln Leu Glu Lys Glu Ile
 85 90 95
 Lys Ile Ile Ala Lys Phe Tyr Phe Lys Asn Asp Gln Ser Leu Ile Tyr
 100 105 110
 Cys Lys Leu Asn Tyr Thr Leu Glu Lys Ile Cys Leu Lys Leu Ile Lys
 115 120 125
 Phe Tyr Lys Lys Phe Tyr Lys Glu Leu Lys Gln Phe Thr Gln Lys Asn
 130 135 140
 Ile Thr Thr
 145

<210> 132
 <211> 921
 <212> DNA
 <213> *Borrelia burgdorferi*

<400> 132
 cacataaaaag aaatagacct aggtatttat caacagtatg taaattagtt gcttgatgct 60
 aaaaaatcga tattaggaga gtttaatgtc taatgttact accatagaga aattagatag 120
 ttttttacia gaagataagt ggacaagaat agttgttaat aattattctc ttgccaaaat 180
 aaaagaattg gatgatttaa taaataatat aattgatgag gggttaacag aggatgtgct 240
 tgatatttgt ggcaggcatt taaaggacgt taaaaaaagc atagcaggctc tttatatttc 300
 tggaatgctt atatatagta ggcgaccttt aaatgatatg aatttacttg ctgttattga 360
 tttgttttct caaaatttaa aatgggctct tgttgagcat atatgtaatg aaatgctttt 420
 aatttctgag aataagcacg ctctttatac tcttgcaaaa atatatgctc agaacaatga 480
 aaatgataag cttccaggta tttggactag aattgttgaa gcagatattg acgacactgt 540
 gtttgttagg caacttgcta cttattatga aactattgat ttgcaaaaat caattttcta 600
 ttttagaaaa gctatttatc gttttattga taaaaaacia atgtcaggaa tcagagaagt 660
 atgggccaag cttattcatt atgtttcaga tgattttgat tcttttttgc ttattttgca 720
 aaaaattgaa aaagatcttg gatttaaaaa ggccatagtt ctttatgagg atttatttga 780
 tcattattct ttgactgaca atgttgacga gacaatagaa attttaaaag gcatttttaa 840
 acttgataac aaaaatcata aggcaagaga aaatttagtt aaatttttaa gagaaagata 900
 taaagatggt aaaaatattg a 921

<210> 133
 <211> 15
 <212> PRT
 <213> *Borrelia burgdorferi*

<400> 133
 His Ile Lys Glu Ile Asp Leu Gly Ile Tyr Gln Gln Tyr Val Asn
 1 5 10 15

<210> 134
 <211> 1005
 <212> DNA
 <213> *Borrelia burgdorferi*

<400> 134
 gtgtcatcag aaagaatcgt tgaattgatt aaagagattt atttagattt tagaaaaggc 60
 aatttcaaag aagcttttagt aaaatccgaa gaggctcatt ctcttgattt tgataatatt 120
 gaaattctaa cagcttttagt aaaatccgaa gaggctcatt ctcttgattt tgataatatt 180
 gaaattctaa cagctttgaa aagttctgtg tattggaatg gtcaagttga aagccttgat 240
 agaatagggc aagattatga aaaggcagaa tttttaataa gagagtggaa taattttgca 300
 ggacgatatt tgaaaaagat gggttgtaat tttttgcaag gtcgcaattc tataaaatat 360
 tttgtgtttc agacctgtct ttatatatat aaaaatatat acaaaatgca tccagaaaat 420
 ttggaccttt taataaaaat tgctaagtct tataagggta tgggaaatta cgagagagca 480
 atcaatgttt ttttgcaaat attaggagat tttaaagata actcagatgt tgttcagagag 540
 cttgctgatt cttatgcgtt ggttgatgaa attaaagaag ctaaagtatt attcagagag 600
 gcttttttta ttaatcctca aaagatagat atatattctc ttgagtctga tatgatttta 660
 agattaatag atcttattaa gtctgacaga aatatttcag atgatcttat aaaagaatgg 720
 attcctgttt atggctctct taatgggtgtt tttaatatta aaagagaggt aaggcctata 780
 gagcttggac agctaaagca gtctgtttac agtttgcgca atgagcttaa agaaaagtct 840
 tatagatcaa taaatgagag catattgctt ccaaggctta ttaataaata tttttggctt 900
 attgatcatt atgtaaggat aaaagaagat agagcacgta ttgatgagat tttgttatac 960
 ataaaagaaa tagacctagg tatttatcaa cagtatgtaa attag 1005

<210> 135
 <211> 314
 <212> PRT
 <213> *Borrelia burgdorferi*

<400> 135
 Met Ser Ser Glu Arg Ile Val Glu Leu Ile Lys Glu Ile Tyr Leu Asp
 1 5 10 15
 Phe Arg Lys Gly Asn Phe Lys Glu Ala Leu Val Lys Ser Glu Glu Ala
 20 25 30
 His Ser Leu Asp Phe Asp Asn Ile Glu Ile Leu Thr Ala Leu Lys Ser
 35 40 45
 Ser Val Tyr Trp Asn Gly Gln Val Glu Ser Leu Asp Arg Ile Gly Gln
 50 55 60
 Asp Tyr Glu Lys Ala Glu Phe Leu Ile Arg Glu Trp Asn Asn Phe Ala
 65 70 75 80
 Gly Arg Tyr Leu Lys Lys Met Gly Cys Asn Phe Leu Gln Gly Arg Asn
 85 90 95
 Ser Ile Lys Tyr Phe Val Phe Gln Thr Cys Leu Tyr Ile Tyr Lys Asn
 100 105 110
 Ile Tyr Lys Met His Pro Glu Asn Leu Asp Leu Leu Ile Lys Ile Ala
 115 120 125

Lys Ser Tyr Lys Gly Met Gly Asn Tyr Glu Arg Ala Ile Asn Val Phe
 130 135 140
 Leu Gln Ile Leu Gly Asp Phe Lys Asp Asn Ser Asp Val Val Ala Glu
 145 150 155 160
 Leu Ala Asp Ser Tyr Ala Leu Val Asp Glu Ile Lys Glu Ala Lys Val
 165 170 175
 Leu Phe Arg Glu Ala Phe Phe Ile Asn Pro Gln Lys Ile Asp Ile Tyr
 180 185 190
 Ser Leu Glu Ser Asp Met Ile Leu Arg Leu Ile Asp Leu Ile Lys Ser
 195 200 205
 Asp Arg Asn Ile Ser Asp Asp Leu Ile Lys Glu Trp Ile Pro Val Tyr
 210 215 220
 Gly Ser Leu Asn Gly Val Phe Asn Ile Lys Arg Glu Leu Arg Pro Ile
 225 230 235 240
 Glu Leu Gly Gln Leu Lys Gln Ser Val Tyr Ser Leu Arg Asn Glu Leu
 245 250 255
 Lys Glu Lys Ser Tyr Arg Ser Ile Asn Glu Ser Ile Leu Leu Pro Arg
 260 265 270
 Leu Ile Asn Lys Tyr Phe Trp Leu Ile Asp His Tyr Val Arg Ile Lys
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<213> *Borrelia burgdorferi*

<400> 136

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<213> *Borrelia burgdorferi*

<400> 137

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 35 40 45
 Ile Tyr Ile Lys Ser Ile Glu Asn Glu Ala Phe Ile Lys Leu Ile Gly
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 Glu Ser Tyr Asp Asn Gly Ala Val Phe Thr Phe Gln Thr Phe Lys Lys
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 tatatcaaaa gcattgaaaa tgaagctttt attaagttaa ttggagaatc ttatgataac 240
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 Lys Phe Asn Leu Ser Phe Lys Asp Glu Ser Trp Ile Tyr Ile Lys Ser
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 Ile Glu Asn Glu Ala Phe Ile Lys Leu Ile Gly Glu Ser Tyr Asp Asn
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 Gly Ala Val Phe Thr Phe Gln Thr Phe Lys Lys Glu Gly Lys Ile Lys
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 Leu Val Phe Thr Tyr Gln Asn Val Lys Asp Ser Ser Glu Phe Asn Lys
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 Ile Ile Ile Leu Lys Ile Thr Lys Asn Phe Glu Val Ala Ile Pro Gln
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 Gly Val Gly Gly Gly Ser Ser Arg Asp Asn Asn Ile Glu Thr Gly Asn
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 Ile Ile Val Arg Ala Leu Asn Leu Ser Tyr Ile Asn Asp Tyr Lys Gly
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 Ala Ile Asp Leu Leu Asn Lys Tyr Asn Phe Asn Asp Asp Lys Tyr Ile
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 Leu Leu Lys Ala Glu Ile His Tyr Lys Asn Gly Asp Tyr Leu Lys Ser
 195 200 205
 Tyr Glu Asn Tyr Leu Lys Leu Lys Ser Lys Tyr Phe Gln Ser Ile Val
 210 215 220
 Phe Asp Leu Ile Arg Leu Ala Ile Glu Leu Asn Ile Lys Glu Glu Val
 225 230 235 240
 Leu Glu Asn Ala Arg Tyr Leu Val Glu Lys Asn Val Asp Phe Ser Glu
 245 250 255
 Ser Ile Tyr Leu Glu Ile Phe Glu Phe Leu Val Thr Arg Gly Glu His
 260 265 270
 Glu Phe Ala Leu Asn Phe Ser Ser Leu Tyr Phe Pro Lys Tyr Ile Asn
 275 280 285
 Ser Ser Phe Ser Asp Lys Tyr Ser Tyr Leu Leu Gly Lys Leu Tyr Glu
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 Ser Glu Ser Lys His Lys Asp Phe Leu Lys Ala Leu His Tyr Tyr Lys
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